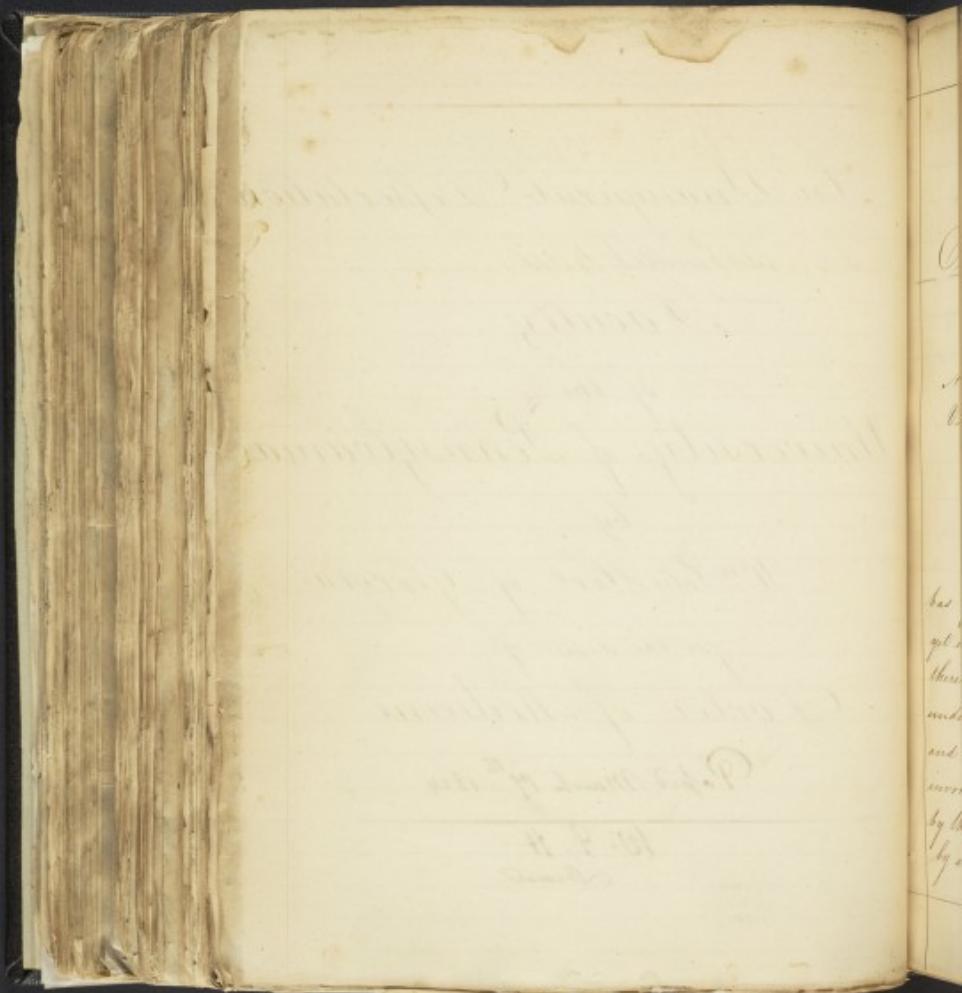


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An Inaugural Dissertation
submitted to the
Faculty
of the
University of Pennsylvania
by
W^m Pea^rl^t of Georgia
for the degree of
Doctor of Medicine
Passed March 17th 1814

W. E. H.
Dean

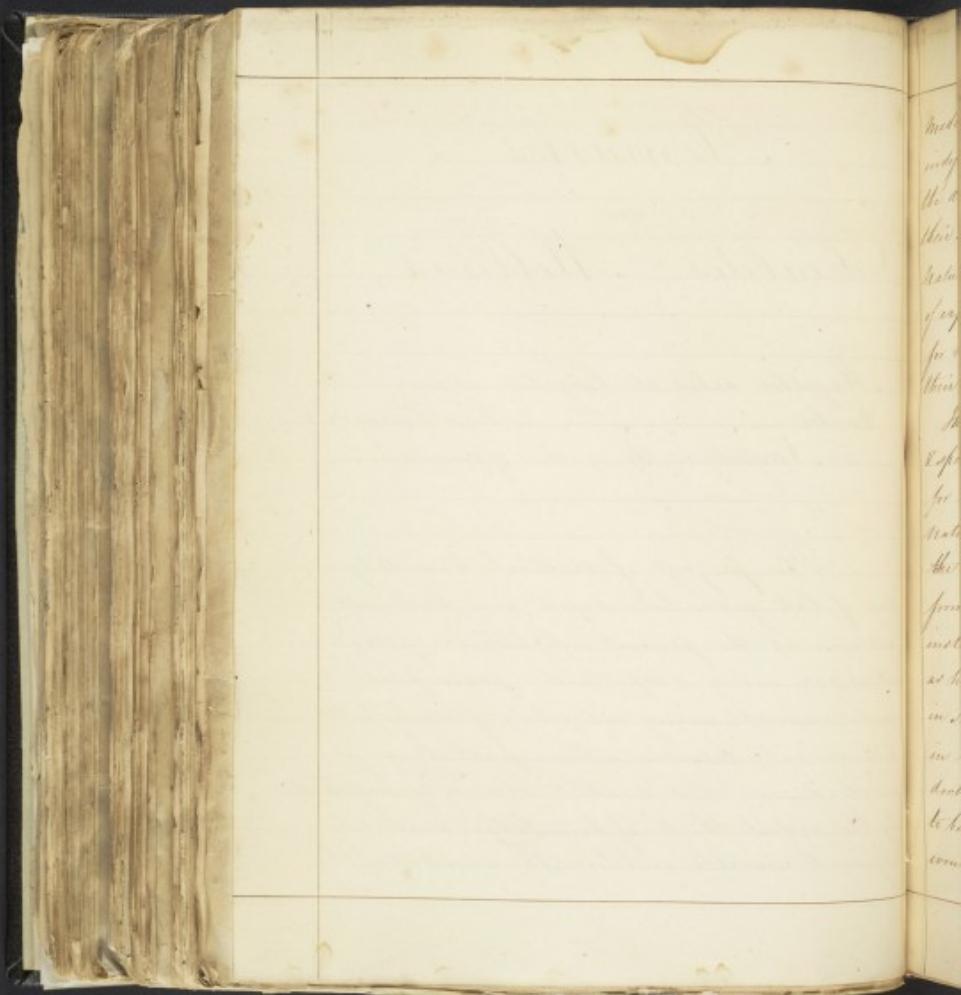


Remarks
on
Diabetes Mellitus.

*Magister artis et largitor ingenii
Venter* Pers. Prolog: v. 10.

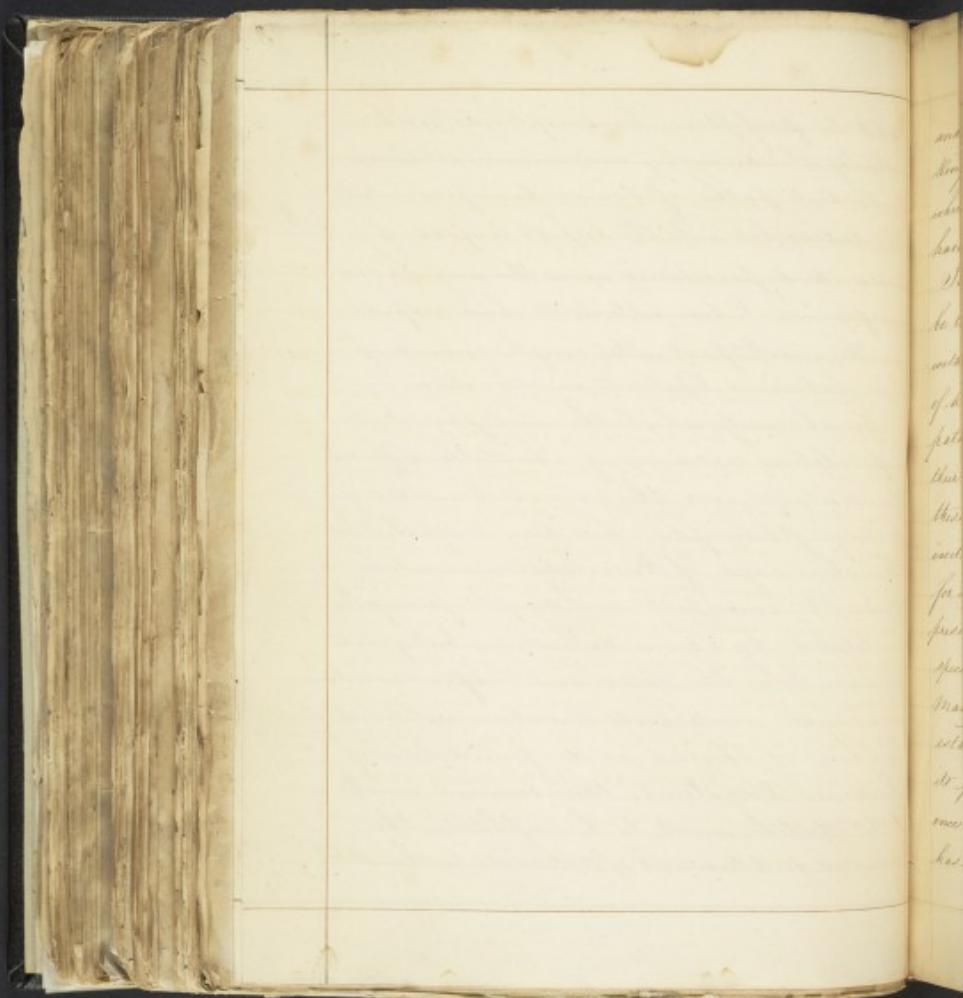
Necessity is the mother of invention.

The progress of medical knowledge has of late years been rapid and brilliant; yet even at the present enlightened period there are many important principles undetermined, many interesting facts disputed, and several diseases whose pathology is involved in considerable obscurity. Impelled by the ardent thirst of knowledge, or excited by an honorable ambition, the members of the



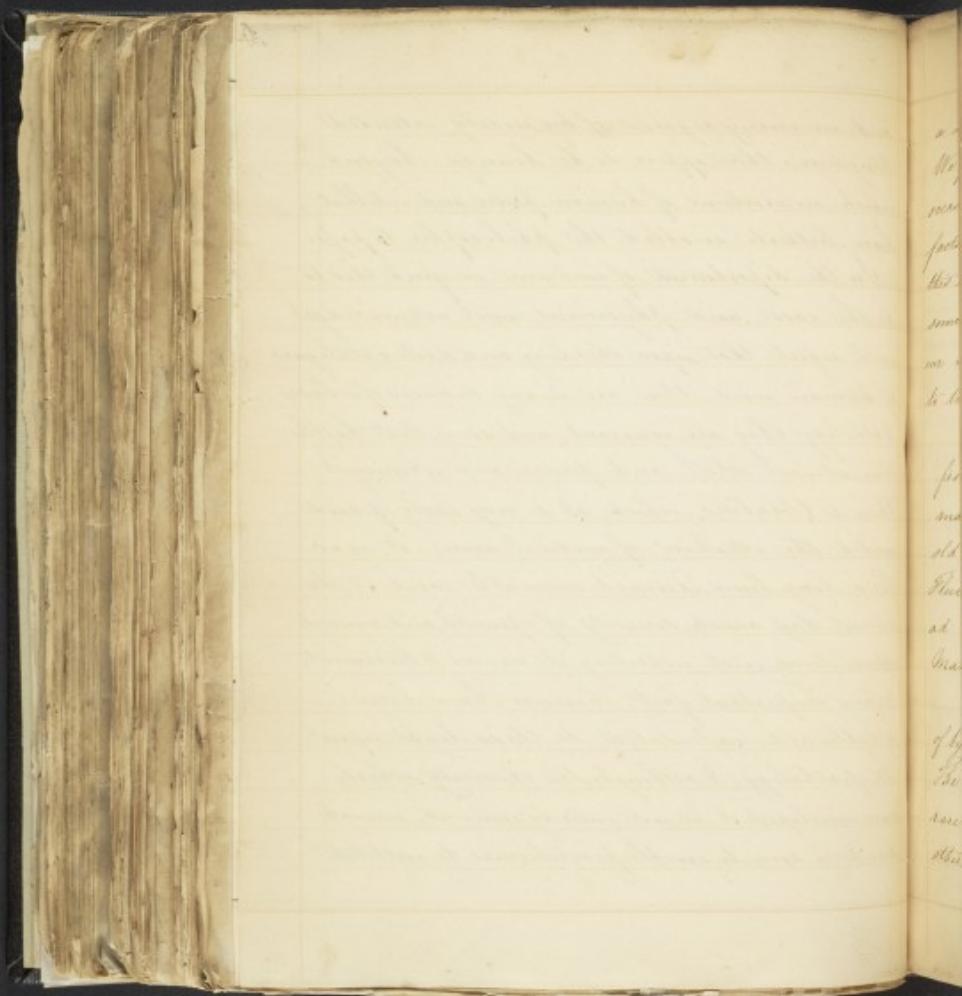
Medical profession have explored with
indelible industry and minute attention
the darkest paths of Science; have prosecuted
their researches into the deepest recesses of
Nature, and proceeding upon the sure basis
of experience & demonstration, have reaped
for the most part the ample reward of
their laborious & patient investigation.

The obscurity which the metaphysical
speculations reasoning of Aristotle diffused
so centred over the various branches of
natural philosophy, has been dispelled by
the clear rays of knowledge emanating
from the more just and simple principles
instituted by Bacon & Newton; but great
as have been the discovered improvements
in Science, since facts have been substituted
in lieu of theories as the foundation of
doctrines & systems, there remains much
to be effected, much to be unfolded; the
wonders and treasures of Nature are inexhaustible;



and in many regions of her widely extended Kingdom, there appear to be bounds beyond which no exertions of human power and intellect have hitherto enabled the philosopher to pass.

In the department of medicine we find this to be the case, and physicians must acknowledge with regret that upon the long and dark catalogue of human woes, there are many diseases of whose pathology they are ignorant, and some that baffle their utmost skill and perseverance. Amongst these is Claudius, which at a very early period excited the attention of medical men; it was for a long time deemed incurable, and at the present day much diversity of opinion and various speculations exist respecting its causes & treatment; many important facts however have been established & calculated to throw light upon its pathology. Although the obscurity which once enveloped it is not entirely removed, enough has been done to enable practitioners to institute

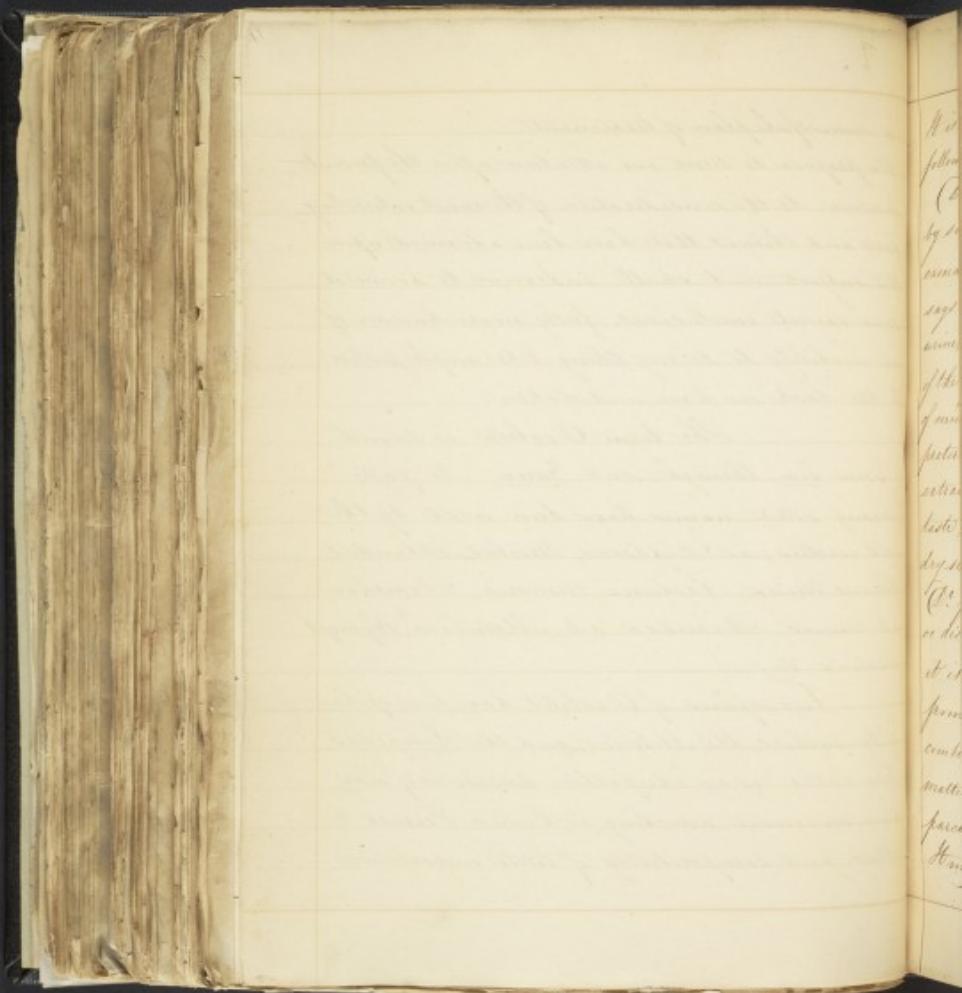


a successful plan of treatment.

We propose to direct our attention upon the present occasion, to the consideration of the most interesting facts and theories that have been advanced upon this subject, and shall endeavour to arrive at some correct conclusions, fully aware however of our inability to do anything like ample justice to the task we have undertaken.

The term Diabetes is derived from dia, through, and baino, to pass; many other names have been used by the old writers, as Dipsacus, Morbus Atibundus, Flavus Veneris, Iacchus Veneris, Diarrhoea ad Veneris, Diarrhoea ad Motulam, Hydrost Diabola &c.

Two species of Diabetes have been spoken of by authors, the Aciditas, and the Insipidas. The latter as an idiopathic disease is of very rare occurrence according to Cullen, Ferrier & others, and comparatively of little importance;



It is to the Diabetes Mellitus that the
following observations will be confined.

Diabetes Mellitus has been variously defined,
by some, as an excessive discharge of urine,
exceeding in quantity the fluid drunk. Beauchamp
says it is a frequent copious discharge of lacteous
urine, in conjunction with an extraordinary tenacity
of the fluids. Dr Cullen calls it a chronic flux
of urine, made in immoderate quantities & of a
putrescent quality. Dr Horne defines it, an
extraordinary increase of urine, with a sweetish
taste, attended with a perpetual thirst, & a
dry skin, which is for the most part scaly.

Dr Good speaks of it as a morbid secretion
or discharge of urine. In Hosack's Nosology,
it is described as an immoderate excretion
from the kidneys, consisting of urine, usually
containing with a large proportion of saccharine
matter, attended with Dyspepsia, great thirst,
parched skin, emaciation & continued fever.
It may be observed that to constitute this

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disease, it is not necessary that there should be an immediate discharge from the urinary organs, though this must doubtless be almost invariably an effect; it is the formation of scrofulous matter in the system which is the peculiar feature of Diabetes Mellitus.

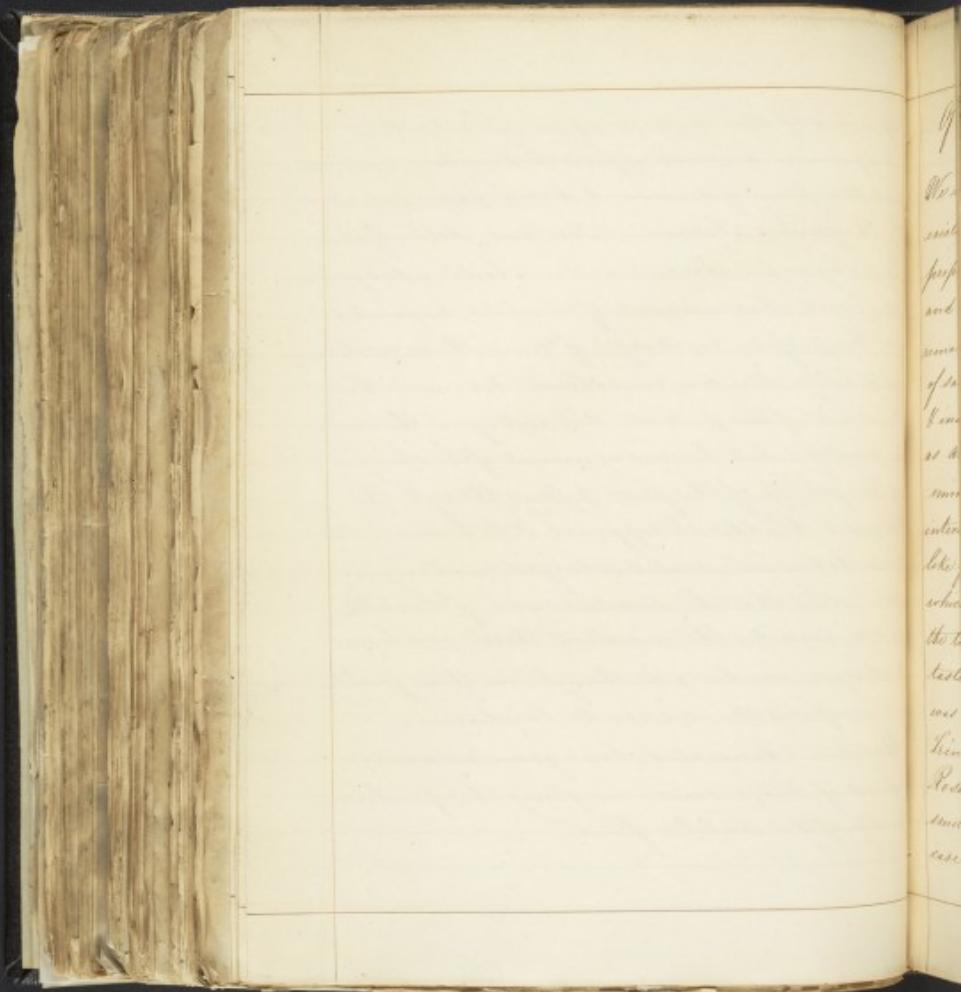
In the Nosological arrangement of this disorder, we find that most writers accord—
Saenger, Linnaeus, Sagar, Chrichton, Parr,
Sauvage & Hottack place it among the Fluxes.
Good, Pinel & Young consider it to be a
secretory disease. Parvin attributed it to
a retrograde motion of the absorbents & placed
it among the diseases of the Absorbent system.
Dr Cullen has placed it in the class Nervous
and Spasmodic. Believing that the flux
is surely an effect of the disease, he red
it appears most correct to view Diabetes
as an affection of the Secretory System.
Before we proceed to consider the causes
of Diabetes, it may be well to notice the

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opinions of the Ancients upon our subject.
Hippocrates does not appear to have been acquainted
with this form of disease, but it has been noticed
by Hippocrates, Aetius, Arislaus, Aetius Galen,
Paulus Eginensis, Avicenna &c. Aetius has given
a long and clear account of Diabetes, he pointed
out the profuse discharge of urine, the emaciation
and debility, the excessive thirst, observed that
the drink of the patient did not equal the urine
in quantity; but he was ignorant of the changes
in the quality of the fluid passing through the
kidney & bladder. He supposed it to be merely the
urine taken in, and discharged unchanged.
Galen states that he saw two cases of Diabetes,
he also describes the constant thirst and liquid
discharged, unchanged though in their quality,
and compares the disease to diurexia.

Mucatius & Semiratus have given an accurate
account of this disease, excepting the peculiar
quality of the diabetic fluid.



Of the causes of Diabetes

We see then that the Antients were aware of the existence of this disease, but of its pathology and proper mode of treatment, they were quite ignorant, and we are not surprised at this, since the most remarkable feature of this affection, the formation of saccharine matter, was unknown to them. Indeed it was overlooked by moderns as well as antients, until the time of Willis. That eminent physician first pointed out this interesting fact, & maintained that the honey like flavour of the urine, arose from a change which the drink had undergone long before the time of Willis however the urine had been tested, and the sweet taste observed, but it was ascribed to the medicines that were used. Kincaid describes a case, in which a palpable *Potassium* affected the urine with its colour small stature. Hauke *Saxonia* in a similar case that fell under his observation, attributed

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the sweet smelling colour glads to the soundness
Person which his patient had taken. It has
been remarked that the saccharine beverage &
dust of the Eastern Nations, are the practice of the
French & Italian Physicians who in most diseases
prescribe Pissans sweetened with honey, will
perhaps account for the early writers having
failed to notice the true characteristic of Diabetes.

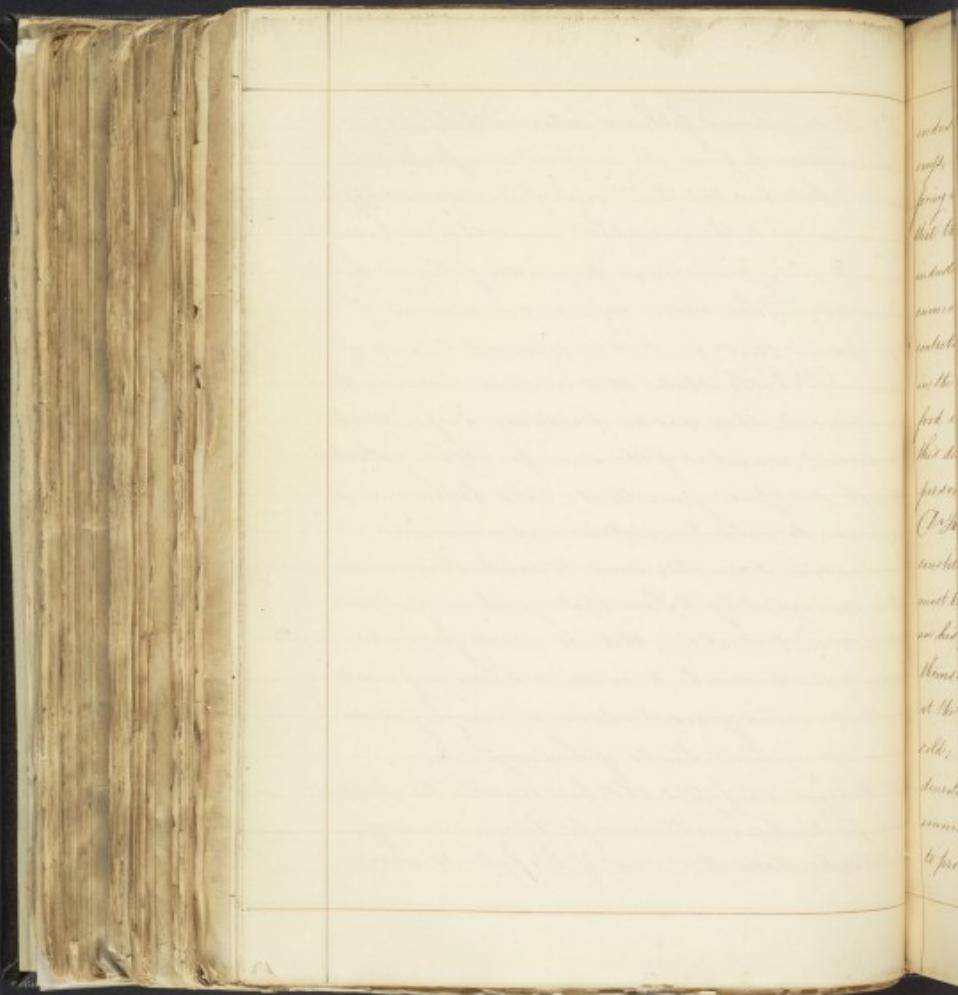
Of the remote causes.

It was observed by Sydenham that Diabetes
followed Intermittents, especially if much oil had
been employed, and that solid purgatives gave
rise to it, whence he drew the conclusion that
it was a disease of debility. McCullin seems to
be at a loss respecting the remote causes of Diabetes,
he says that in most of the cases which occurred in
his practice, he was unable to assign any particular
cause; he admits that it often attacks men who have
been intemperate in the use of spirituous liquors at
some previous period; that it happens to persons
of broken constitution or who are in a cacheticic state;

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that it sometimes follows Intermittents, & that it has occurred from the excessive use of mineral waters; but he adds that none of these causes apply very generally to the cases that occur, that such causes are not always nor even frequently followed by Diabetes, & that there are many instances of Diabetes that cannot be referred to any of them. Dr. Rolle states that in several cases which he collected, there was an hereditary disposition to the disease, members of the same family being affected through successive generations. Cold bathing, and exposure to cold moisture under various circumstances are also said to create this disease. It is remarked by Dr. Parr that youth is rarely ever attacked with Diabetes, that its most frequent subjects are those who have drunk liberally of wine in their earlier years, who are also employed in the more violent kinds of laboring.

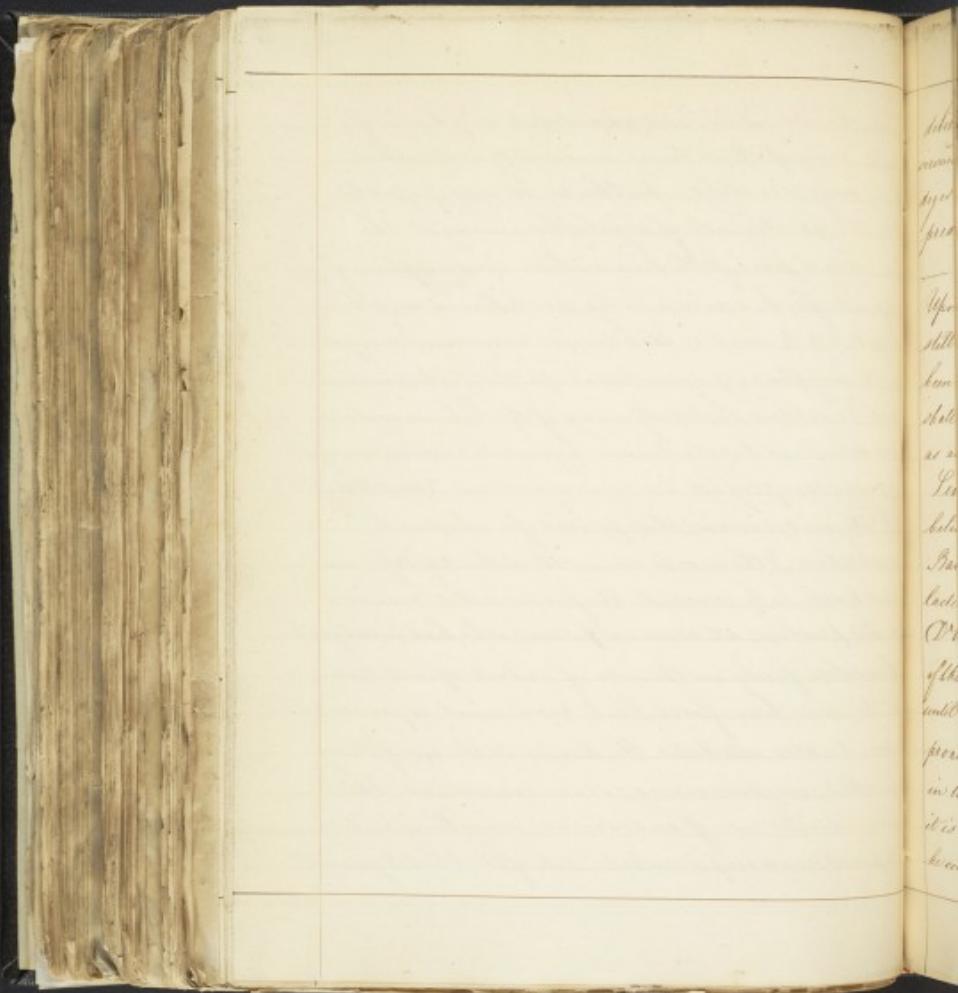
Dr. Ferrar confesses that he is unable to assign any particular remote cause for the occurrence of Diabetes, he states that most of his patients were



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industrious poor, not addicted to any kind of
vices, some of them being moderately well, others
being very scantily; he thinks it very possible
that the greater use of vegetables amongst the
industrious poor, & the diminished consumption of
animal food, occasioned by hard times, may have
contributed to render this disease more common yet
in the neighbouring agricultural districts where animal
food is seldom tasted by many of the labouring class.
This disease is hardly known, & generally occurs amongst
persons employed in manufactories. (Med. Hist.)

Dr Thomas considers that persons of shattered
constitution, those who are in the decline of life, are
most liable to be attacked. The few cases that occurred
in his practice, all arose in persons who had indulged
themselves freely in the use of ardent spirits, who
at the same time had been much exposed to
cold; he also attributes the disease to the use of strong
diuretics, excessive venery, severe concussions, the
immoderate use of acid drinks, or anything tending
to produce an impoverished state of the blood & general



ability. Dr Horneb. is of opinion that any circumstance that will produce debility of the syphilitic organs may be considered as causing predisposing to Debility.

Of the proximate cause.

Upon this point a considerable difference of opinion still exists. Numerous are the theories that have been advanced; the greater part of them we shall hastily pass over, dwelt only upon such as are most ingenious & plausible.

Sennertus suspected some communication between the liver & emulgent vessels.

Bartolotti referred the proximate cause to the lacteals, at that time newly discovered.

D'Willis imputed this disease to a dissolved state of the blood, which opinion seems to have prevailed until the time of Cullen, who suggested that the proximate cause of Debility, might be some fault in the assimilating functions, but observes that it is a theory embarrassed with difficulties which he could not very well remove.

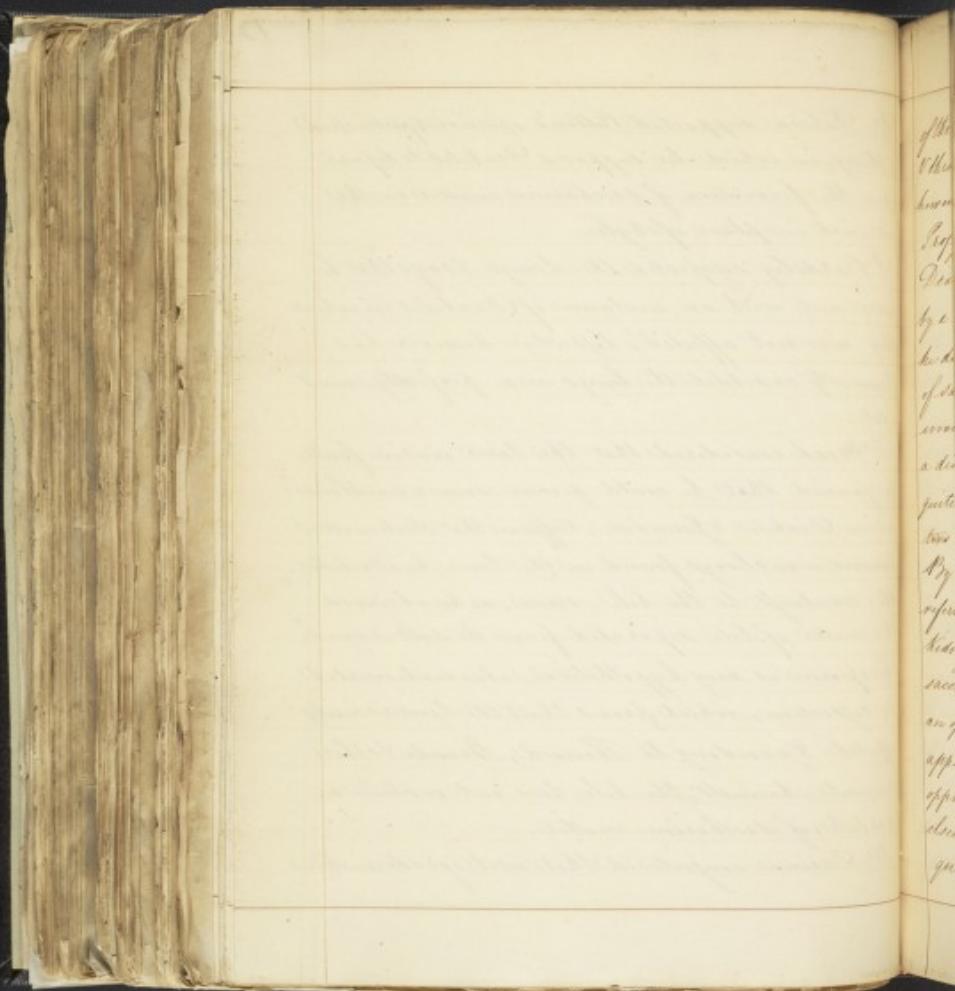
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Dr. Dobson supported Cullen's opinion & published a theory, in which he supposed Diabetes to depend upon the formation of saccharine matter in the stomach in place of chyle.

J. Bardely suspected the lungs & says that he never met with an instance of Diabetes in which they were not affected; dissection however has frequently exhibited the lungs in a perfectly sound state.

Dr. Mead considered that the liver was in fault; he fancied that he could perceive some resemblance between Diabetes & Jaundice; affirms that slate-metastatic tumours were always found in the liver; he attributes the scurvy to the bile, since, as he observed the water of bile separated from its salt is sweet. His opinion is very hypothetical, also controverted by dissection, which proves that the liver is rarely affected; according to Pernod, Brände & other eminent chemists, the bile does not contain a particle of saccharine matter.

Dr. Parrot conjectured that a retrogradation



of the lymphatics might be the immediate cause.
This opinion was at first well received; it has
however long since been universally rejected.
Professor Richter of Gottingen, supposes that
Diabetus is of a spasmodic nature, occasioned
by a stimulus acting upon the kidneys, but as
he does not attempt to account for the production
of saccharine matter, as a spasm of the kidney
would rather tend to diminish than increase
a discharge, we must reject the opinion as
quite unsatisfactory; he evidently confounds the
two species of Diabetus.

By Dr. Thomas the proximate cause is
referred to a perverted or diseased action of the
kidneys, & he thinks that by this means the
saccharine matter is produced in the urine;
an opinion to which we can by no means apply
appearances after death being often decidedly
opposed to this idea, compelling us to look
elsewhere for a more satisfactory solution of the
question.

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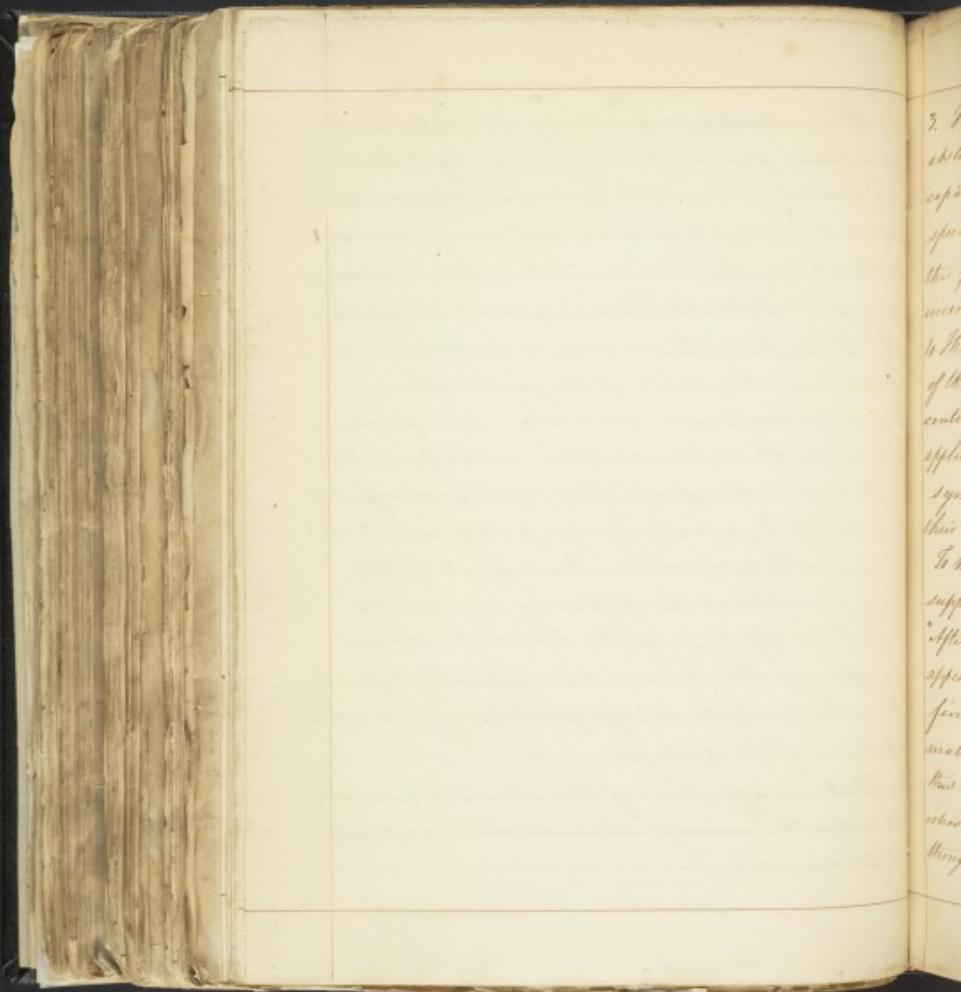
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D^r. Horne attributed the disease to a defect in the assimilating process, & is supported by D^r. Rolle, who devoted no small degree of attention to this subject. Various observations will merit our serious consideration; he maintains that the immediate cause of Diabetes Mellitus, is a morbid condition of the stomach, with an increased secretion & alteration in the quality of the gastric fluid,

producing saccharine matter by a decomposition of the vegetable substances taken in as food; that the kidneys & other parts of the system are affected secondary & generally by sympathy, as well as by a peculiar stimulus. In support of this theory he adduces the following arguments.

1. That an affection of the stomach always accompanies the disease, & is materially different from that which is sympathetic of urinary affections of the kidneys.

2. That an affection of the stomach generally precedes the various characteristic symptoms of the disease.



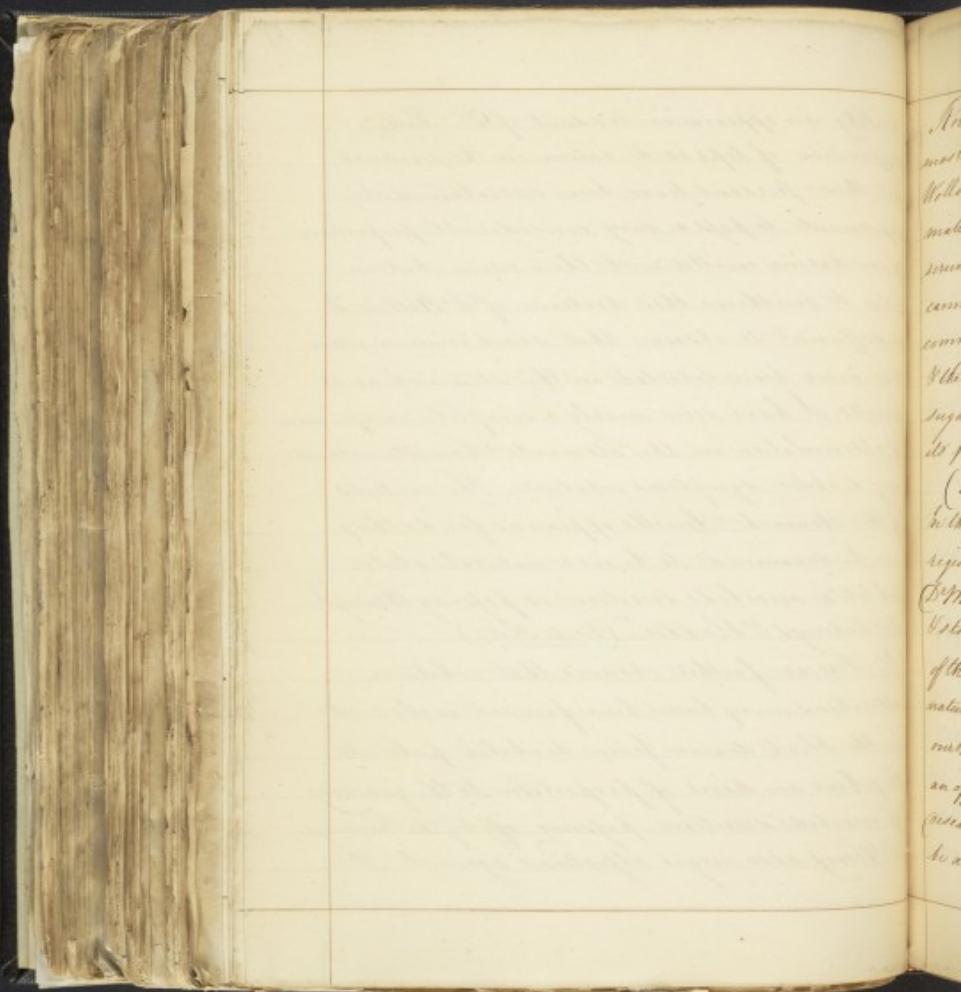
3. That a diet of animal food withdraws the stomach from vegetables or other substances capable of forming sugar in the stomach, specifies removes the general symptoms, as the formation of saccharine matter, & the increased discharge by the urinary organs.
4. That digestion has shown no morbid state of the kidneys, but what may be referred to a continuance of increased action, from the application of simple stimulus, & probably sympathy augmenting merely the capacity of their vessels.

To this position which is certainly well supported, Dr. Purvis objects, barges as follows. After revolving in my mind the morbid appearances which I have witnessed, I could not find reason to believe that the saccharine matter originated in the stomach. I have at this time under my care two diabetic patients whose complexions are ruddy & distinct, & who though considerably reduced in size, have too

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healthy an appearance to admit of Dr. Rollis's supposition of depraved action in the stomach; yet those persons have been ascertained by experiment to pass a very considerable proportion of saccharine matter with their urine; but in order to overthrow this doctrine of Dr. Rollis, it is sufficient to observe that saccharine matter has never been detected in the stomach and bowels. I have seen nearly a complete suspension of fermentation in the stomach & bowels, without any diabetic symptoms whatever. The contents of the stomach & bowels appear as far as they can be examined to be in a natural state, whilst a morbid secretion is passing through the kidneys & bladder." (Med. Hist.)

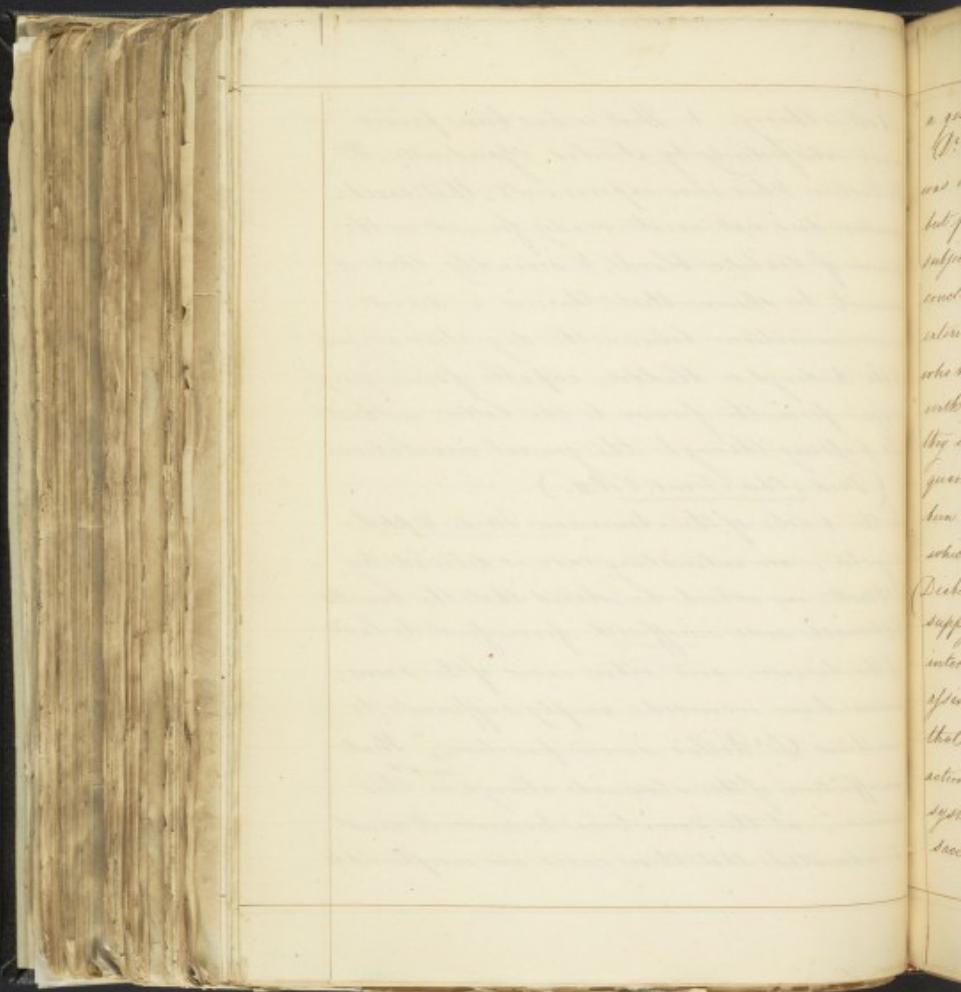
D. Hirsch further observes, that whatever alterations may have been fancied or observed in the blood drawn from diabetic patients, they bear no kind of proportion to the quantity of morbid secretion passing off by the kidneys. Dr. Henry also urges objections against Dr.



Rollo's theory. 1. That it has been proved most satisfactorily by Nicol & Spudville, Dr. Wallerian & his own experiments, that saccharine matter does not exist ready formed in the serum of sickled blood, & secondly, that it cannot be shown that there is a direct communication between the digestive organs & the kidneys or bladder, capable of conveying sugar from the former to the latter, without its passing through the general circulation.

(Med: Chir: Trans: Vol. II.).

In the 1 vol: of the American Med: & phil: register, an interesting case is detailed by Dr. Mott, in which he states that the bowels & stomach were unaffected from first to last of the disease, and other cases of the same nature have occurred, amply sufficient to overthrow Dr. Rollo's second position, "that an affection of the stomach always ^{exists} in this disease"; at the same time however it must be admitted that these cases are exceptions to



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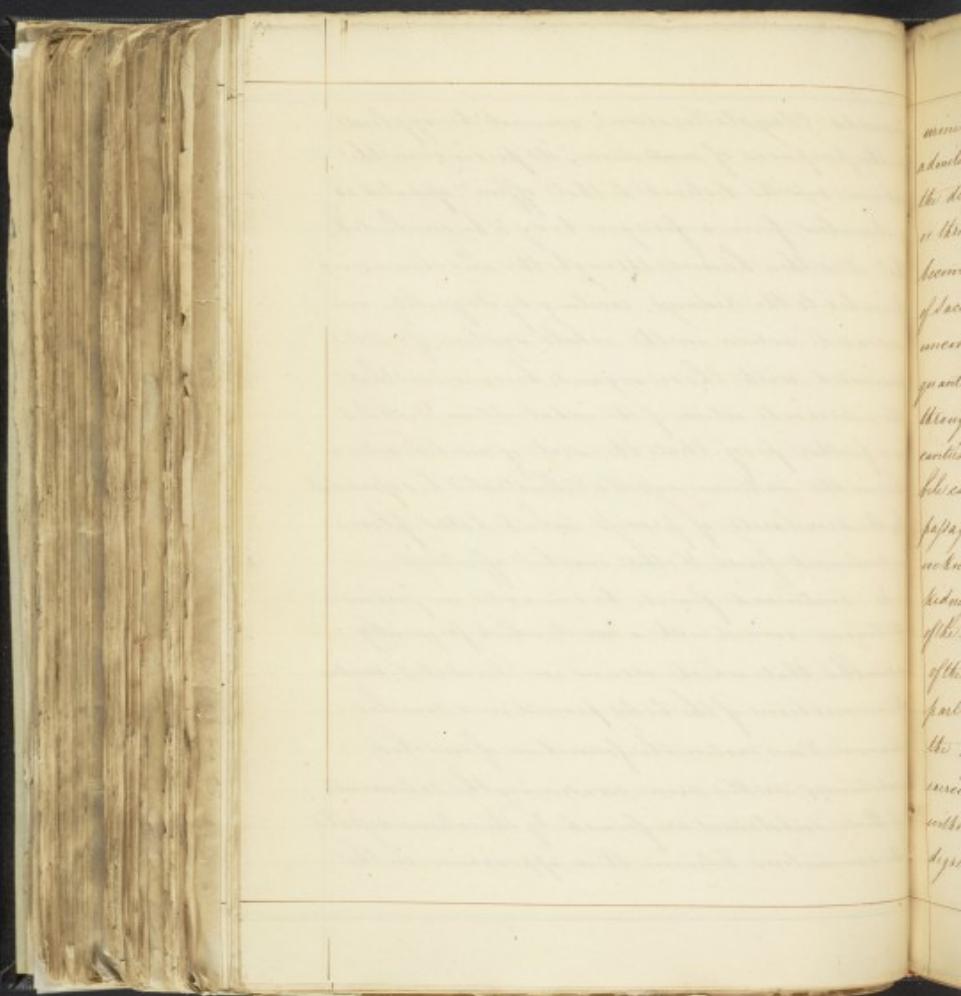
a general rule.

D^r. Senior at one period believed that Diabetes was a local disease seated in the kidneys, but further experience & consideration of the subject, induced him to draw a different conclusion. - He says that the internal & external ulcerations of the kidneys of patients who have died of the disease, may be referred with propriety to the extreme irritation which they undergo in transmitting such unusual quantities of a foreign body, & that it has not been observed that the ulcerations of the kidneys which take place in aged persons, have produced Diabetes. He agrees with Dr Cullen that the supply of nourishment for the solid parts is interrupted, but denies that the defect of assimilation is in the prime vice, he conceives that the extreme reflexes take on a morbid action, & instead of supplying the waste of the system by nutritious particles, secrete the excreta: matter, which having acquired a tendency

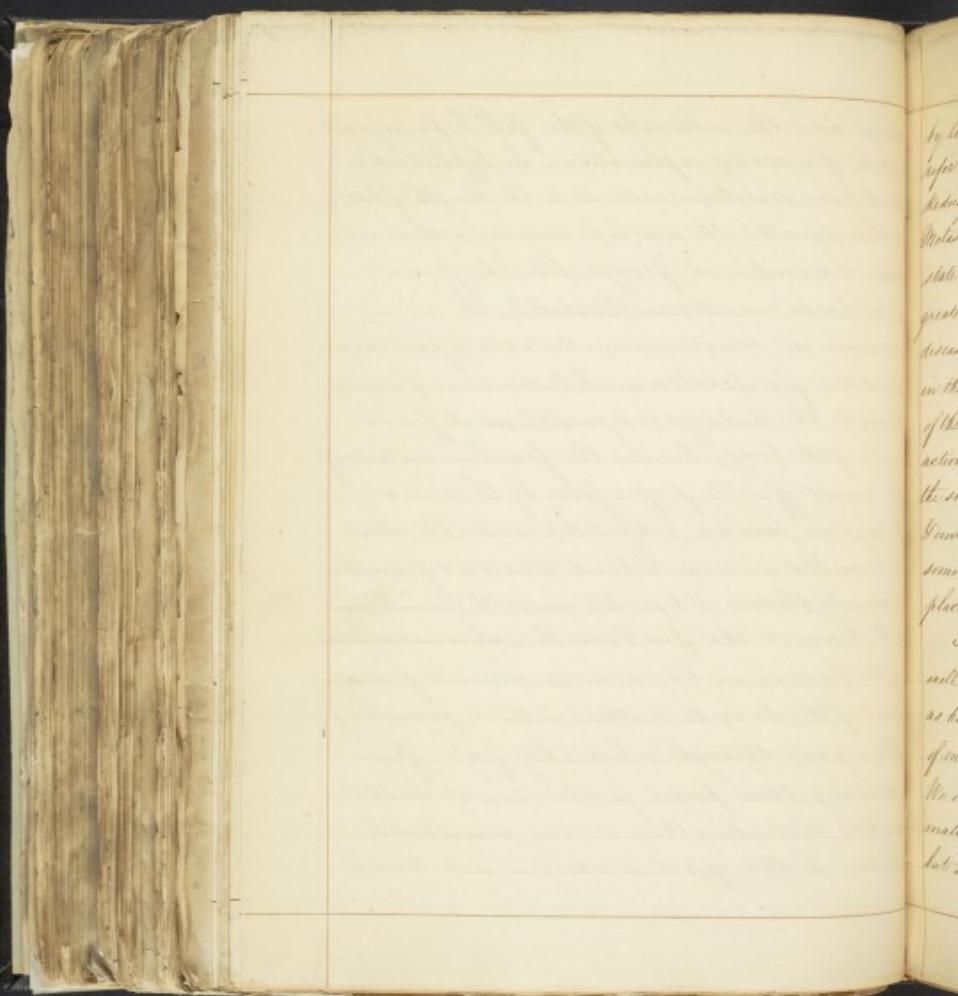
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towards Crystallization, cannot be applied
to the purposes of nutrition; its presence in the
extreme vessels destined to that office, operates as
a stimulus from a foreign body & he concludes
that it is then hurried through the anastomosing
branches to the kidneys, exciting by its quality an
increased action in the whole system of vessels
connected with those organs, he conceives that
the increased action of the adalents in Diabetes
is a further proof that the seat of morbid action
lies in the extreme vessels, illustrated his opinion
by the similarity of proofs which take place
in continued fevers, & other morbid affections.

In continued fevers, he remarks, we perceive
the tongue covered with a crust, which frequently
resembles that which occurs in Diabetes; under
the invagination of the body proceed in a similar
manner & we notice the formation of morbid
substances in the urine occasioning the sediments.
If these substances are formed by the extreme vessels,
the connection between their appearance in the



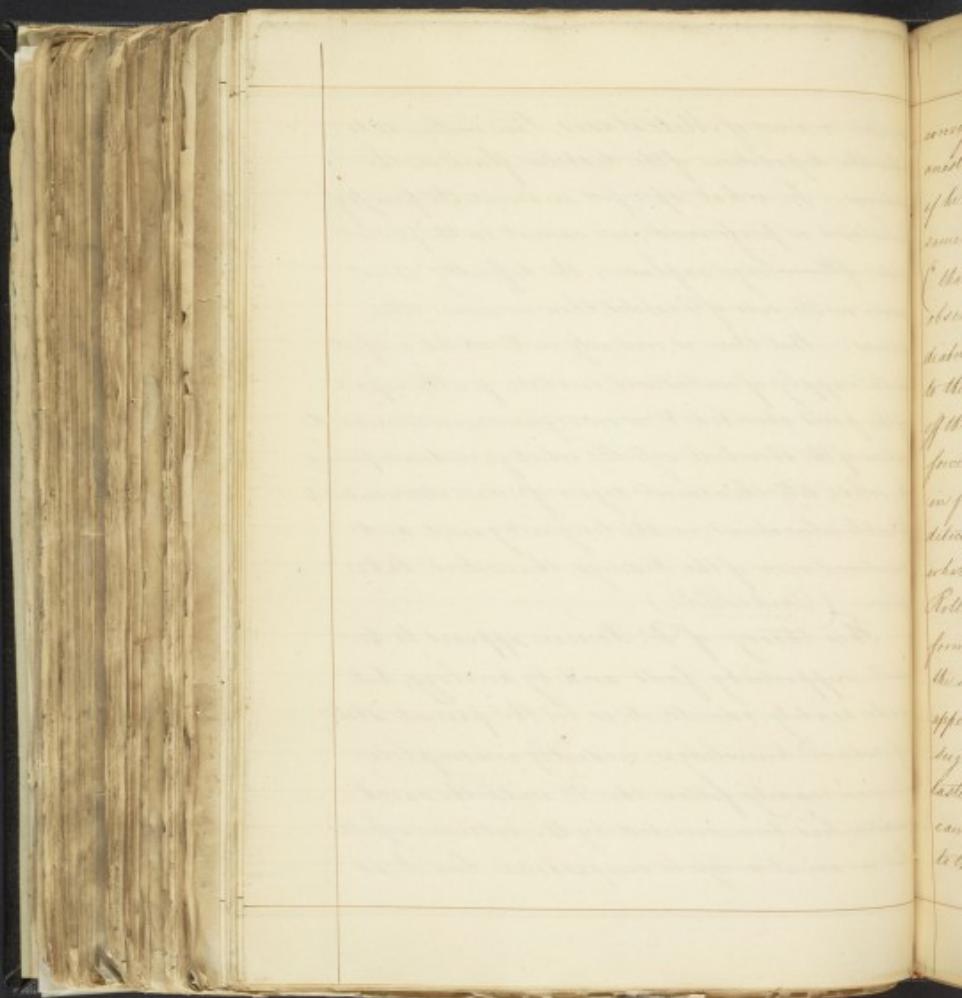
urine, and the intervals of the febrile paroxysms admits of a ready explanation. In syphilis where the disease sometimes extends to the length of two or three months, the morbid urinary sediment becomes a continued propp, like the formation of saccharine matter in Diabetes. It is no uncommon occurrence in diseases to find large quantities of natural or morbid secretions passing through the kidneys or deposited in different cavities of the body; besides the familiar instances of the excretion of urine in proper form by the urinary passages in faeces, or deposited under the skin we know that wine in Sicilia is carried from the kidneys & bladder, & deposited under the membrane of the brain, & that pus & even the calcareous matter of the bones are in like manner removed from one part of the body to another, without preventing the organs through which they pass, from exercising their proper functions, or at least without disturbing them in any remarkable degree. To this operation which is well known



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by the name of Metastasis, I am inclined to refer the deposition of the diabetic fluid in the kidneys. In what specific manner the process of Metastasis is performed, we cannot in the present state of knowledge explain; the difficulty is not greater in the case of Diabetes, than in some other diseases. But there is evidently in Diabetes a defect in the supply of nutritious matter, for the repair of the parts absorbed, & in consequence an increased action of the absorptive vessels, which go on decomposing the solids, till the utmost degree of emaciation ensues. Dental alterations in the tongue & gums, and sometimes even of the kidneys themselves take place. (Med. Hist.)

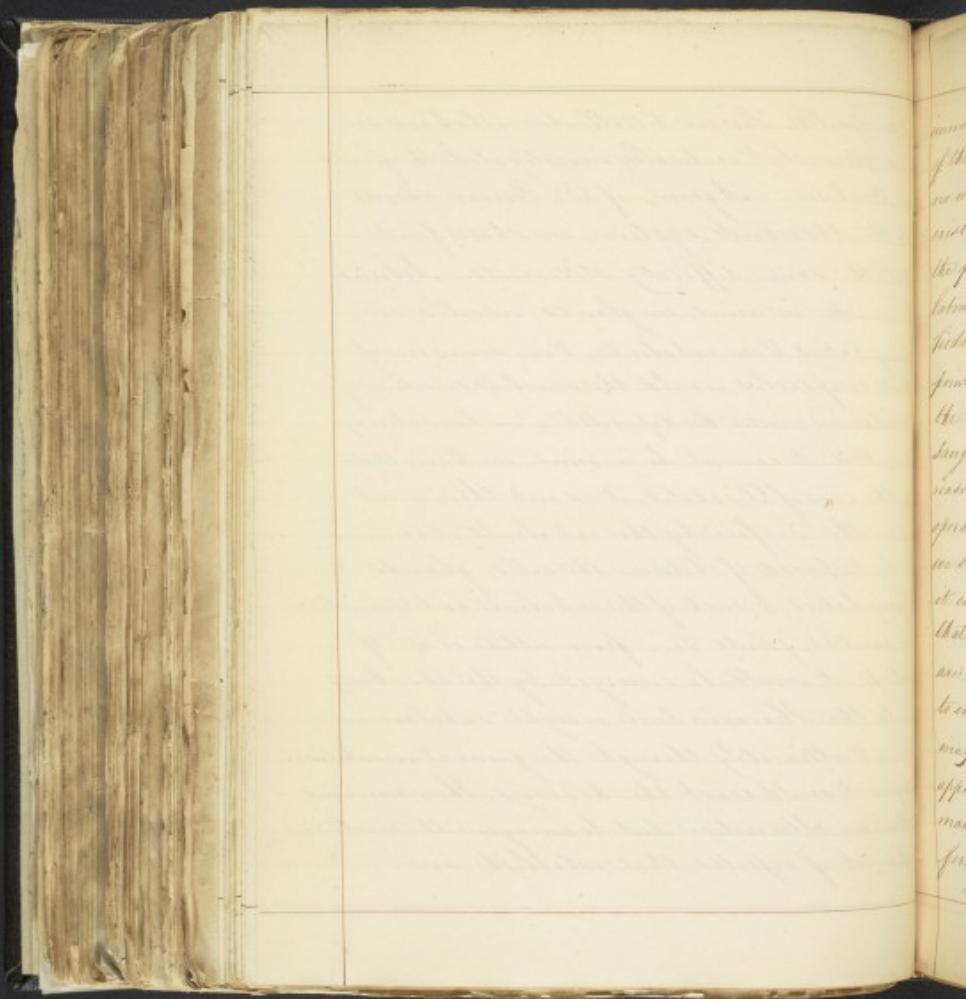
This theory of Dr. Penick appears to be well supported by facts and by analogy, but as he readily admits, it is in the present state of medical knowledge, evidently incomplete. We can readily follow the Dr. until the吸收 matter has been secreted by the extirpated vessels, but we are at a loss to comprehend how it is



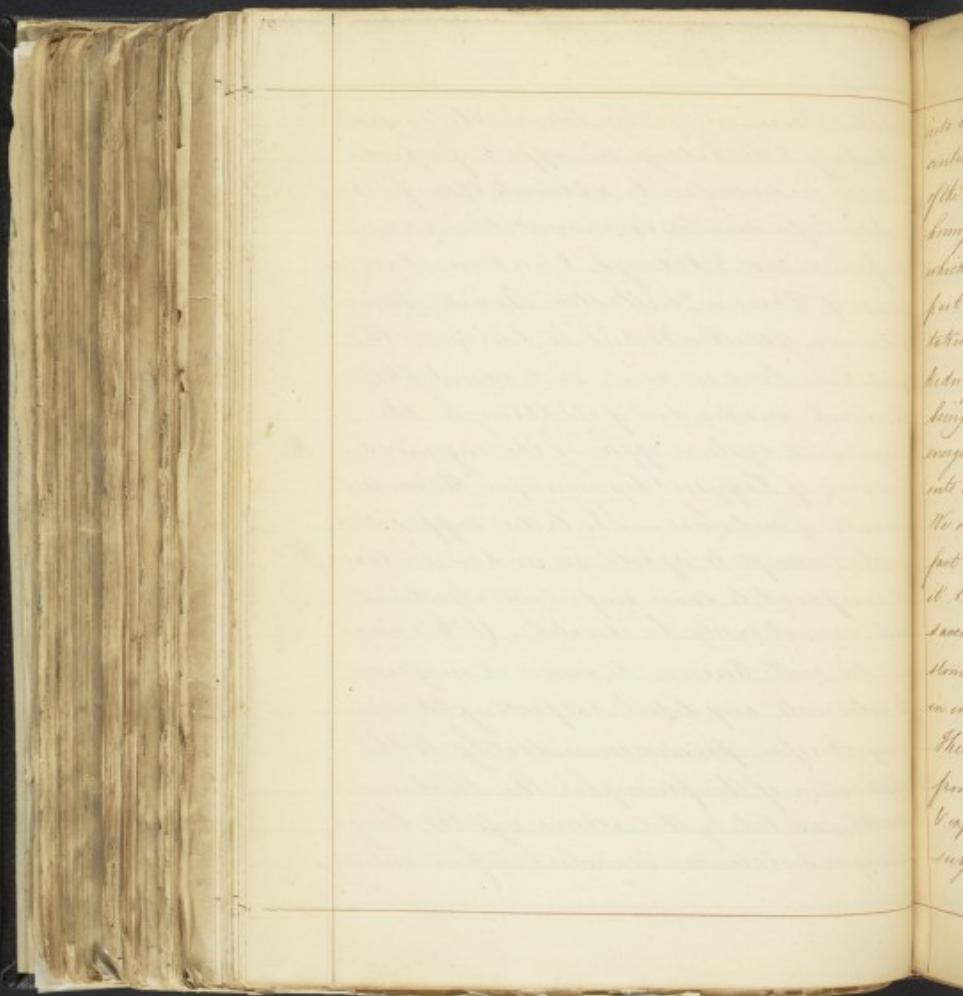
conveyed thence to the kidneys, book at another
quastioning branches to which he alludes;
if he refer to the sanguineous system, the very
same arguments that he urged against D'Rolla
(that certain alterations may have been
observed or fancied in the blood drawn from
diabetic patients, it bears no kind of proportion
to the quantity of sugar-lid secretion passing
off through the kidneys"), applies with equal
force to his own position; but the evidence
in favour of such a view matter having been
detected in diabetic blood is very trivial, for
what is the conclusion which Dr. Dobson &
Rolla, the great advocates for this fact, draw
from their experiments. — simply that
the serum of the blood often assumes the
appearance of whey. Likewit sams to contain
sugar, or at least has lost its usual solid
parts. (Penn: Chemistry Vol IV.) such testimony
cannot with any shadow of propriety be opposed
to the positive assertions of Henry, Nicolai,

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Guillemin, Poirier & Wallerston who have so
industriously & critically investigated the fluids
in Diabetes. Again, if Dr. Poirier admits
to the Absorbent system, we shall find
that the same difficulty still exists. Arteries
terminate in veins, in glands, in cells, in
lymphatics. View exhalents, view some one of
these receptacles would the morbid secretion of
succharine matter be deposited, we have already
seen that it cannot be in veins, we know that
in the case of Diabetes, it is not thrown out
upon the surface by the exhalents, it remains
to be disposed of below the cells, glands,
lymphatics, & such of the exhalents as terminate
in cavities, joints &c. from either or all of
which it would be conveyed by the absorbent
into the Thoracic duct or right subclavian
vein, & ultimately through the general circulation
before it could reach the kidneys. There remains
then no alternative but to imagine the existence
of a set of vessels that establish an



immediate communication between the surfaces
of the body & the kidneys, in support of which
no more evidence can be adduced than for the
existence of a similar communication between
the lungs & kidneys, I now know that the
labours of Darwin, Wollaston, Brander, Mancini,
Viduani, & Miller & others to determine this
point have been in vain, or to admit that
the saccharine matter does pass through the
sanguineous system, applying the ingenious
reasoning of Professor Chapman upon the modes
operandi of medicines. The latter supposition
we shall attempt to uphold, aware however that
it is exposed to some important objections
that cannot easily be avoided. Of C's views
and his will know to render it necessary
to enter into any detail respecting them, we
may therefore proceed immediately to the
application of the principle. The saccharine
matter secreted by the extreme vessels being a
foreign substance, is excluded from entering



into the absorbent system by those "vigilant
sentinels" which guard the various approaches
of the body, it must first be reduced to a
homogeneous fluid by the assimilating power
which Dr C. concludes to be possessed by every
part of the Absorbent Apparatus; it is then
taken up, carried along the usual route to the
kidneys & through the urinary organs, when
being removed beyond the control of the vital
organs, chemical affinities are again brought
into action, & the sanguine matter is regenerated.
We observe that although the admission of this
fact removes one of the objections to Dr Rolle's theory
it leaves the other in full force, namely that
sanguine matter has never been detected in the
stomach or Intestines, & that cases have occurred
in which the stomach was unaffected.

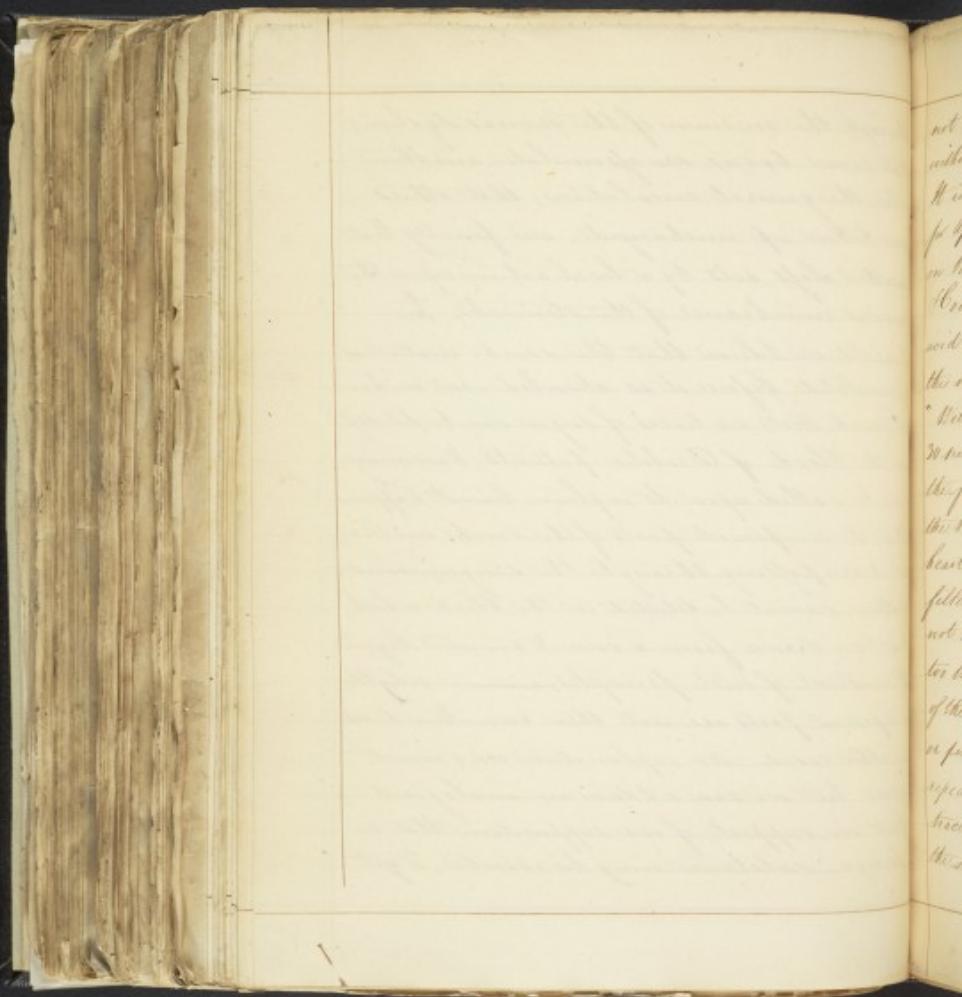
The objections that may be urged, arises
from the circumstance that the testimony
& experiments of physiologists upon this
subject are so much at variance: Thus

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while many eminent men are of opinion that
the Nervous system alone is acted upon by
foreign or poisonous substances, that none but
a homogeneous fluid can be taken up by the
absorbents, & support their doctrine by ingenious
reasoning & an appeal to fact, we find others
who profess as strong claims upon our faith
contending for directly opposite theories of fact.
The experiments of Magendie & Seglas, of
Dr. Lawrence & Coated, & of Sir Edward Home,
besides other facts well authenticated certainly
lead us to infer that the absorption of other
than homogeneous substances may take place
instead of endeavouring to reconcile evidence
apparently so contradictory, which is daily
brought forward by the advocates of systems,
& speculating in the dark about things that
are beyond our reach, we prefer admitting
that more than one law governs the operation
of substances upon the living system, that
some are incapable of being absorbed, & yet

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through the medium of the Nervous system; that some bodies are assimilated and then enter the general circulation; that others are taken up unchanged, and finally that another class acts by a local action upon the mucous membranes of the stomach. In Diabetes we believe that the saccharine matter is assimilated before it is absorbed, but we have observed that no traces of sugar can be detected in the blood of Diabetic patients, & you may now be called upon to explain how it happens that the component parts of the saccharine matter, which are passing through the sanguineous system, cannot be detected in the blood which has been drawn from a vein & removed beyond the control of vital principles; — why the component parts are not then recombined as in other cases. An explanation we cannot give, but we can adduce an analogous fact in support of our supposition that a foreign substance may be absorbed, & yet



not detected in the fluids either without or
without the control of the vital principles.
It is recorded in the Edinb: Med. & Surg: Jour:
for Apr. 1823 art. An experimental inquiry
on Phosphy by Oxalic Acid. By Dr. Christian
Crundel. After proving distinctly that the
acid is absorbed, they proceed to determine
the nature of its action on the blood.

With this view, therefore, in a dog who died
30 seconds after the injection of eight grains into
the femoral vein, we examined very carefully
the blood in the veins caeca & right side of the
heart. It did not redder. Still, in the
filtered serum the hydrochlorate of hem caused
not the slightest precipitate. In many animals
to which had been killed by the introduction
of the poison into the stomach, intestines, pleura
or peritoneum, these experiments were carefully
repeated; & we never could detect the slightest
trace of oxalic acid, even in the offal near at
the seat of absorption. We have also examined

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the chyle in the thoracic duct after the prism had been introduced into the intestine; we have even attempted to trace it in the bile, the urine, the frothy contents of the air cells of the lungs, & the moisture of the various surfaces, but with no better success.

After so many unequivocal proofs of its absorption, it was certainly a most unexpected circumstance that it should not be found in the blood; & it is not the less singular, when we consider how easily it is detected if added to blood just drawn from a vein. The test of hydrochlorate of lime, as every one knows is exceedingly delicate; & we have ascertained, that its delicacy is not impaired by the presence of such principles as are contained in the serum of the blood.⁴

We next proceed to examine the Symptoms.

Diabetes is very insidious in its approach.

D'Cullen observes that it comes on slowly and almost imperceptibly without any previous disorder;

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that it often arises to a considerable degree and subsists long without being accompanied with evident disorder in any particular part of the system; on other occasions, (perhaps such are of the most frequent occurrence,) *Bulusum*. Other typical symptoms appear & subside for a time, immediately previous to the accession of Diabetes, as stated by Dr. Rolle, *Pariet. Sc.*, however when completely formed, the symptoms are well marked. The patient has most voracious appetite, and insatiable thirst; the tongue is foul, covered with a thick, dry, yellow crust & sometimes white with bright red edges, the mouth is parched, there is a constant spitting of viscid phlegm of a mustyish or bitridish taste, the gums are often ulcerated, with other striking evidences of derangement in the exfoliated viscera, as a insulation of internal heat & flattery, the skin is hot, dry, parched & often scaly, the pulse ranges from 80 to 90 beats in a minute; an irritable, fretful state exists, the bowels are

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usually costive, this discharge by the urinary
organs is almost invariably increased in quantity
of a light straw colour, having a sweet taste,
resembling honey, & the patient complains of a
sense of weight & great uneasiness in the
urinary passages; there is great prostration
of the bodily powers with rapid emaciation;
the mind is exceedingly depressed. When the
disease proves fatal, the patient generally
dies with all the evidences of exhaustion.
The progress of Diabetes is much influenced
by circumstances, such as diet, regimen,
mental emotions &c.

Sometimes Diabetes Mellitus is suspended
by the attack of another disease; Dr. Gregory of
Edinburgh mentions two instances, which
occurred in his practice, in one all the diabetic
symptoms were suspended during an attack
of Pneumonia, & in the other by Tonsillitis,
but sometimes other disorders will supervene
without interrupting the course of the original

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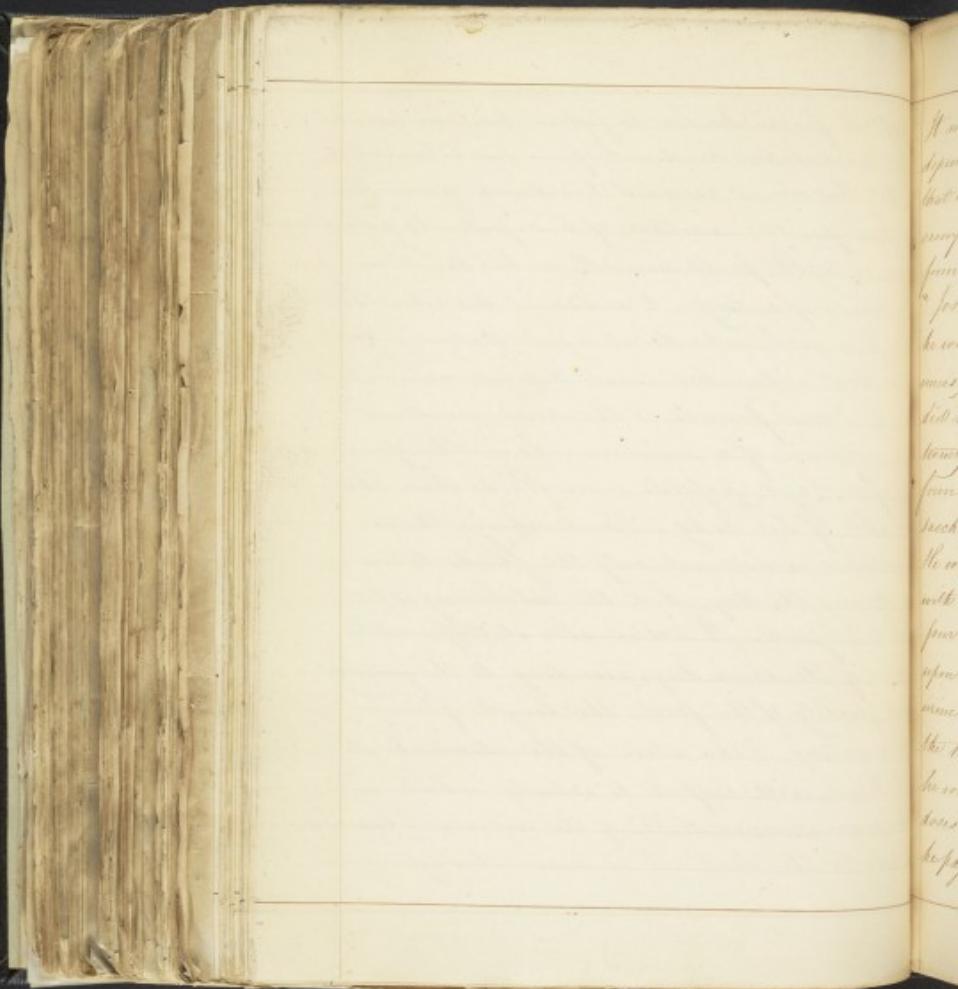
disease. In the 100th of Annals Medico-Polit. Register the case of a boy nine years old is recorded, who, when in a very emaciated state from the effects of Diabetes, was attacked by Petechia & Pneumonia, died from effusion of mucus into the lungs, the diabetic symptoms continuing throughout. The stomach & bowels were unaffected during the whole time.

It has been remarked that diseases which invade a constitution under the influence of Diabetes, are commonly of an inflammatory type often prove fatal.

We have already observed that the discharge of fluid by the urinary organs is not always in excess in this complaint. It will be found to vary very much. Dr. Perini's patients passed upon an average from three to four quarts in the day, according the quantity of fluid drunk by about one quart. Vassal, & he had one patient who passed twenty three pints in twenty four hours. One of St. Remes' patients

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passed from twelve to fifteen pints in twenty four hours, when his draughts from ten to twelve pints so that his urine exceeded his drink generally by two pints; another of his patients passed seven or eight pints more than his drink in the course of a day. Cardanus described the case of a girl who discharged thirty six ppts each day, when her meat & drink amounted to only seven pounds, & Shenkle mentions an instance of a woman who in the space of a few days, passed more fluid than the weight of her body. The discharge then sometimes needs not only the fluids taken in during the day, but the whole ingesta solid & liquid. It varies also at different hours of the same day, according to the quantity and quality of the food, the length of time after eating. The state of the stomach at the time, with respect to acidity, which in the more chronic state of the disease is variable, while in the acute it is more steady.



It moreover appears that the debility generated depend more upon the quantity of such matter that is formed, than of the fluid discharged, exemplified by the following cases extracted from Dr. Horner's Med. Hist. Vol. IV.

Josh. Fletcher was admitted July 1st. 1811; he was emaciated, had a foul tongue, and uneasy sensations in the testicles; his urine did not exceed five pints in quantity during twenty four hours, but it was by experiments found to contain a considerable portion of such matter; he had been ill about ten months. He was ordered 3*i*g Cinchona, & 3*i*g Urac. Ursi with opium gr.ⁱⁱ, to be taken with lime-water four times a day; he was directed to lie upon animal food alone; in the 7th his urine was reduced to four pints & a half, on the 10th to three & a half, during this period he was generally constive & required frequent doses of Castor oil; from the 11th to the 13th he passed only three pints of water in 24 hours.

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and the proportion of saccharine matter was still undiminished; from the 14th to 25th July, he passed but two pints & a half in the day, yet was found to contain an equal quantity of saccharine matter as before. After some weeks, the disease yielded, but urine became brackish, & his health being restored, he was discharged cured. In this very curious case we have an example of Diabetes Mellitus; in which the urine was scarcely greater in quantity than what is natural, even at its commencement, & long before its conclusion was reduced to the natural standard without a diminution of the relative quantity of saccharine matter, yet the general debility and emaciation were as remarkable as if he had been voiding urine in very large quantities.

Dr Blacke evaporated the urine of two of Dr Homis patients, & found that urine case each pound yielded $\frac{2}{3}$ pt. of brown saccharine matter resembling sugar, & in the other each pound yielded $\frac{3}{4}$ pt., so that the first patient

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posed 3^{xxviii}. of Sack: matter in twenty four hours, when he made fifteen pints of wine. Dr. Rolle related a case in which 3^{xxix}. were dissolved in twenty four hours: According to Cruikshank's & Turner, the average proportion of such matter is estimated at about $\frac{1}{16}$ in every pint of fluid.

It has been disputed whether the saccharine matter existing in diabetic wine be identical with sugar. Mr. Cruikshank in his experiments extracted from urine about $\frac{1}{16}$ of its weight of a sweet tasting extract like honey, which when treated with nitric acid, yielded the same proportion of Oxalic acid, as an equal quantity of common sugar would have done; making allowance for the saline substances present. No saccharic acid was formed; hence it follows that this substance is not analogous to the sugar of milk, but more common sugar in its properties. It cannot however be made to crystallize regularly like common sugar;

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and Nicolas affirms that when treated with lime, it is decomposed; if so it certainly differs essentially from common sugar, which was first found by Brückenthal to be capable of uniting to lime without decomposition.

Nicolas, Gaudioville & Thénard have obtained by the fermentation of diabetic extract, very near by the same weights of Alcohol as would result from an equal weight of vegetable sugar. (Mem: Chem. & Med: Chir: Trans: Vol II.)

The following experiment was made by D'Henry upon the urine of one of Dr. Fissier's patients; its specific gravity varied from 1029 to 1033, the first urine voided in the morning by a healthy person having usually the specific gravity of 1030, when evaporated by the heat of steam it yielded about $\frac{1}{4}$ of its weight of a tenacious extract, which became hard & brittle in cooling & consisted almost entirely of saccharine matter, without any of that peculiar substance (Urea), which distinguishes healthy urine;

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no urea at least could be discovered by the application of Nitric acid, which is the usual test employed, & which causes an immediate precipitation of bright parti^l scales, resembling very closely in their appearance the Boracic acid, when urea is present. In decided cases of Diabetic Mellitus, O'Sherry has invariably found that the Nitric acid failed to give any indications of the presence of urea, he however suspects that the action of the acid upon the urea might possibly be prevented by its agency upon the greater proportion of Sugar, to determine this point, Nitric acid was added to artificial mixtures of the extract from diabetic urine & natural urine, & from his experiments he inferred that urea can no longer be detected by Nitric acid in the extract from any mixture of diabetic & natural urine when the former exceeds the latter by a greater proportion than six to one or as nearly as he could estimate from other experiments, when solid urea is

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less than $\frac{1}{10}$ of the weight of the mixed extract. Dr. Henry however at last succeeded in detecting urea in this aforesaid case by the following methods of analysis.

There is one property of urea originally pointed out by Scarberry & Vauquelin which enables us to detect it even when present in such minute quantities as to escape discovery by the Nitric acid. Amongst the great variety of animal products this appears to be the only one which is decomposed when in a state of solution by the temperature of boiling water. At this low degree of heat, its elements held together by a balance of affinities which is easily disturbed, arrange themselves in a new order. Ammonia & Carbuncus acid are generated, & Carbinate of Ammonia is produced, equal in weight to about two thirds that of the urea. It is in this fluid therefore condensed during the evaporation of Diabetic urine, that we are to look for traces of the existence of urea; & in this fluid I have invariably

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found a sufficient quantity of Carbonate of Ammonia to restore the colour of reddened blued paper, & to precipitate Muriate of lime. When the distillation is carried so far as to reduce the residuum to charcoal, the last products are strongly acid, in consequence of the production of the pyromurous acid from the decomposed sugar. Even in these latter products a proportion of Ammonia exists, & may be obtained in a separate form by first saturating the liquid with pure alkali, & then submitting it to a second distillation. The condensed fluid will invariably be found to contain volatile alkali, though often in very minute quantity. It is in the Ammonia which comes over early in the distillation of distilled urine that I am disposed chiefly to insist, as establishing the presence of urea, because we are unacquainted with any other animal substance, which can give origin to the Vol. alk. under such circumstances. Another proof of the existence of some portion

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of urea in diabetic urine, may in many instances be obtained by a careful observation of the phenomena attending its spontaneous decomposition. At a temperature exceeding 60° Fahr., diabetic urine passes rapidly to the acidous state, but if the succession of changes be carefully watched, it will be found that there is a point at which, before it becomes acid, it exhibits to sufficiently delicate tests, distinctly alkaline properties. In the cases when I have attempted to estimate the deficiency of urea in Diabetes, the urea has not appeared to exceed from 10 to 15 of the quantity contained in an equal measure of healthy urine. (Med. Chir. Trans. Vol. II.)

O'Henry therefore concludes that urea may be discovered in all diabetic urine; & this is an important fact since it proves that the secretory office of the kidneys, however it may be deranged, is not altogether destroyed even in the severest forms of the disease.

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The Blood when first drawn in this disease exhibits the buffy coat in most instances. In the Vol. Med. Trans., several cases are detailed in which the lancet was employed. In every instance the first blood drawn had the appearance of a homogeneous black mass, possessing no firmness, resembling treacle, & not separating by itself into serum & coagulum. After each bleeding it became firmer & more natural in appearance, & in the first case after the fourth P.S. the coagulum was covered with a membrane analogous to the buffy coat but of an intense scarlet colour. Dr. Dobson (whom I have mentioned) has maintained, but so has been already seen upon very slender evidence, that sanguineous matter exists in diabetic blood, but the statements dispensing this fact are more than sufficient to satisfy my mind upon this point. Dr. Purser examined with the greatest attention a small quantity of blood taken from the arm of Brookis, a patient whose case was decidedly

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Diabetes Mellitus. It did not afford the smallest trace of sugar, on the most careful analysis.

Appearances post Mortem.

(Skeptrum), though it has disproved many theories, has not contributed much to elucidate the nature of Diabetes. The liver has been frequently found in a perfectly sound state, & it has often occurred that no morbid change could be detected in any organ of the body, a circumstance that affords the strongest possible support to Dr. Tissier's theory of the proximate cause being seated in the extreme vessels. The kidneys have been generally found enlarged, especially the tabulae arteriales, & in a very flaccid state. In some instances, they have been found much more vascular than in a healthy state & containing in their infundibula a quantity of whitish fluid resembling pus, but without any signs of ulceration, at the same time the superficial veins on the surface were found to be much fatter

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of blood than usual, forming a most beautiful
net work of capilli. Cullen considers the diseased
state of the kidneys as the effect, not the cause
of the disease. Fissier refers the flaccidity of
these organs to the general debility of the system,
Dr Roll thinks that dissection has shown no
morbid condition of the kidneys, but what may
be referred to the stimulus of the morbid fluid
passing through them, but what has been
already observed sets the matter beyond dispute,
the kidneys, as well as every other organ in the
body, have been found unaffected; it is not long
since an instance of this fact occurred in the
New York Hospital, the kidneys of the patient
were perfectly natural. The whole of the
Meatting has been found much diseased, the
glands remarkably enlarged; many of the lacteals
have likewise been seen considerably enlarged
& diseased. In some cases the coats of the bladders
are much thickened, & its size less than natural,
containing some muddy urine.

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In the writings of the ancients, nothing useful is to be found respecting the cure of Diabetes.

This disease was for a long time deemed incurable, nor is it a matter of surprise that all the means employed for its cure should have failed, when we consider that Physicians overlooked the most important feature of the disease, & were quite ignorant of its pathology. It would be needless to enumerate the various modes of treatment that have been tried & found unsuccessful. Of late years two modes of treating Diabetes have been instituted, both have been attended with very happy results although quite opposed in their principles.

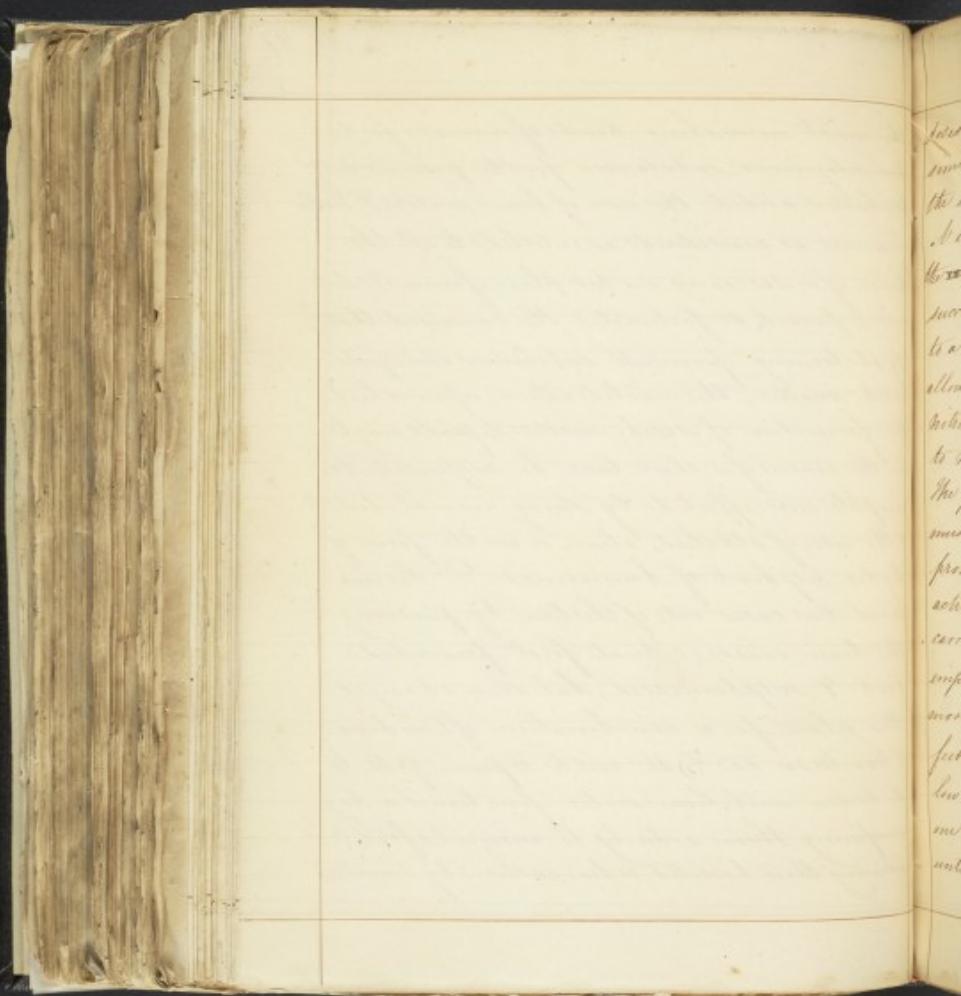
The Tonic practice was first suggested & employed, the Delisting subsequently -

The Tonic practice is founded upon the opinion that Diabetes is a disease of debility which idea seems to have been suggested by Sydenham. Mescaline & Willis prescribed

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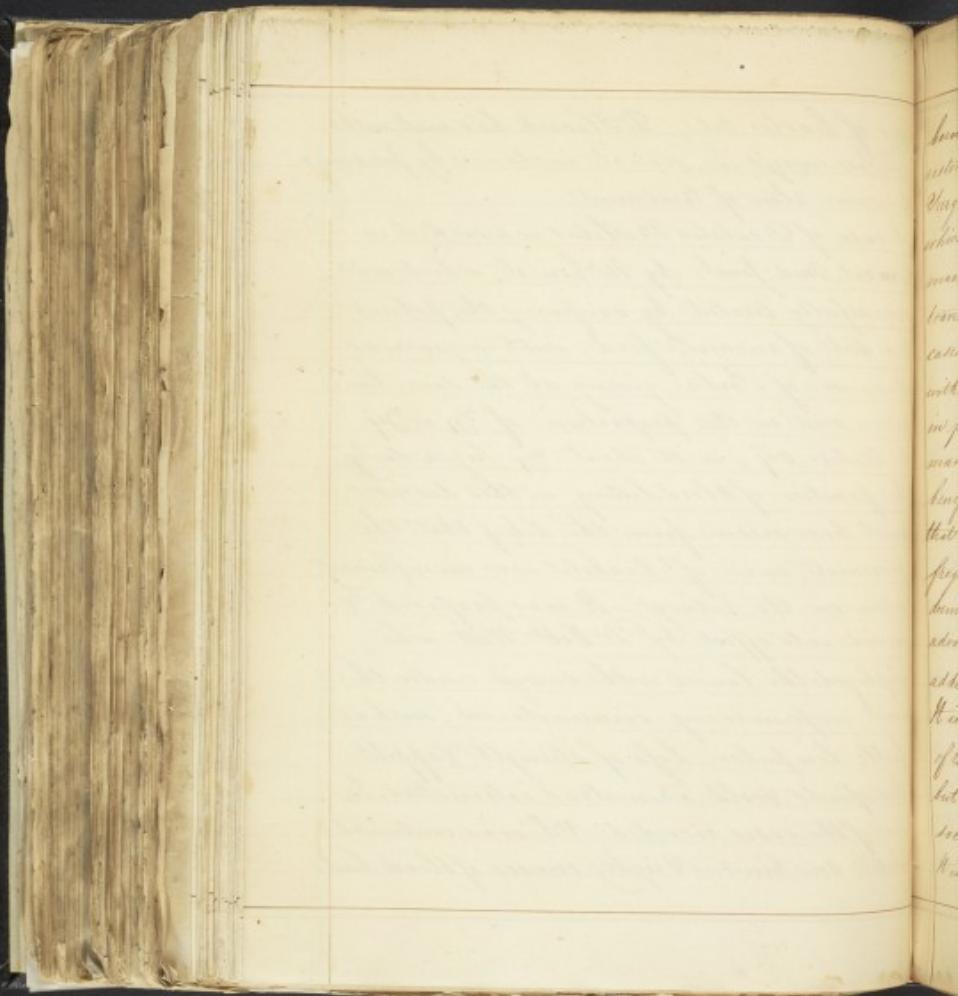
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the most nourishing kind of animal food
vomitorious substances for the patient's diet,
the latter added the use of lime water. Dr Rollo
however is considered as entitled to all the
honour of a discovery in his plan of animal diet
which proved so fortunate. He conceived that
by abstaining from all substances that yield
such matter, the morbid action upon which
the formation of such matter depends might
in the course of a short time be suspended, & a
complete cure effected by strong animal diet
& the use of alkalies, alone, or in the form of
hydro-sulphur of Ammonia. - Dr Ferrier
cured ten cases out of thirteen by pursuing
the tonic course; he at first prescribed
bark & sulphuric acid, but soon changed
this plan for a combination of Cinchona
& Nux Vomica with Opium grs 6 to
be taken with lime water four times a day,
confining them entirely to animal food &
opening their bowels when costious by small



does of Castor oil. Dr Hooke has met with similar success in several instances by pursuing the same plan of treatment.

A case of Diabetes Mellitus is recorded in the ~~xxm~~ Vol. Med. Journ. by M'Graw, which was successfully treated by confining the patient to a diet of animal food, with a generous allowance of Butter, giving at the same time nitric acid in the proportion of $\frac{3}{4}$ or $\frac{5}{4}$ to Water $\frac{1}{4}$, with about $\frac{3}{4}$ Sugar daily. The practice of blood letting in this disease must have arisen from the belief that the proximate cause of Diabetes was an inflammatory action in the kidneys. It was proposed & carried into effect by Dr Robt. Wall who employed the lancet with success under the most unpromising circumstances, such as feeble pulse, loss of strength & appetite, low spirits & cold & clamorous extremities. In one of the cases recorded U.S. was continued until one hundred & eighty ounces of blood had



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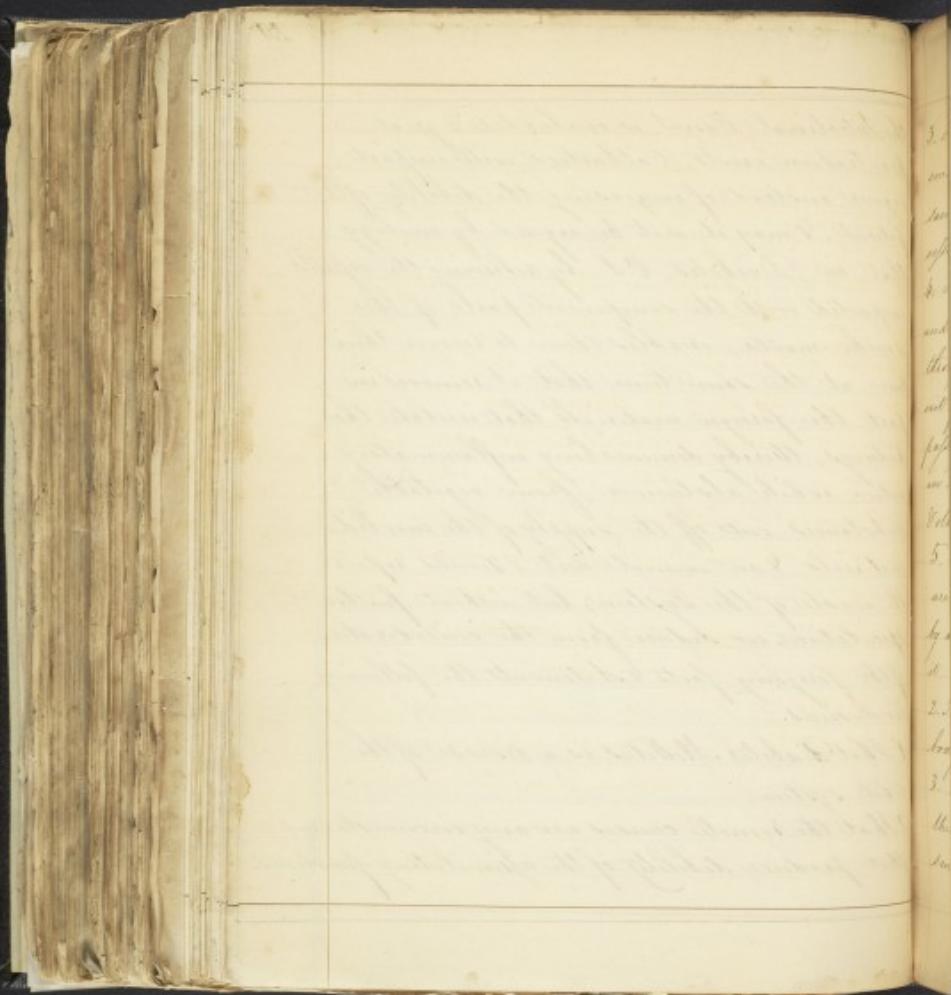
been taken away, the result was a perfect restoration to health. In the Edinb. Med. & Surg. Journal No. ^{XXIX}, a case is related, in which Dr. S. frequently repeated cured a woman of twenty two, & in the 4 vol. Med. Trans. of London College of Physicians, several cases are detailed, treated in the same manner with success by Dr. Salterley; in the first in particular the symptoms were strongly marked, and so evident were the progressive beneficial effects of the successive bleedings, that the patient was induced to desire a more frequent repetition of the remedy than was deemed prudent. Those gentlemen however who advocate the use of the lancet enjoin a strict adherence to an animal diet.

It is indeed difficult to reconcile the compatibility of two methods of cure, so opposite in their nature, but to facts we must submit however ignorant severally they may prove to our speculations. It is well known that in Fevers sometimes, when

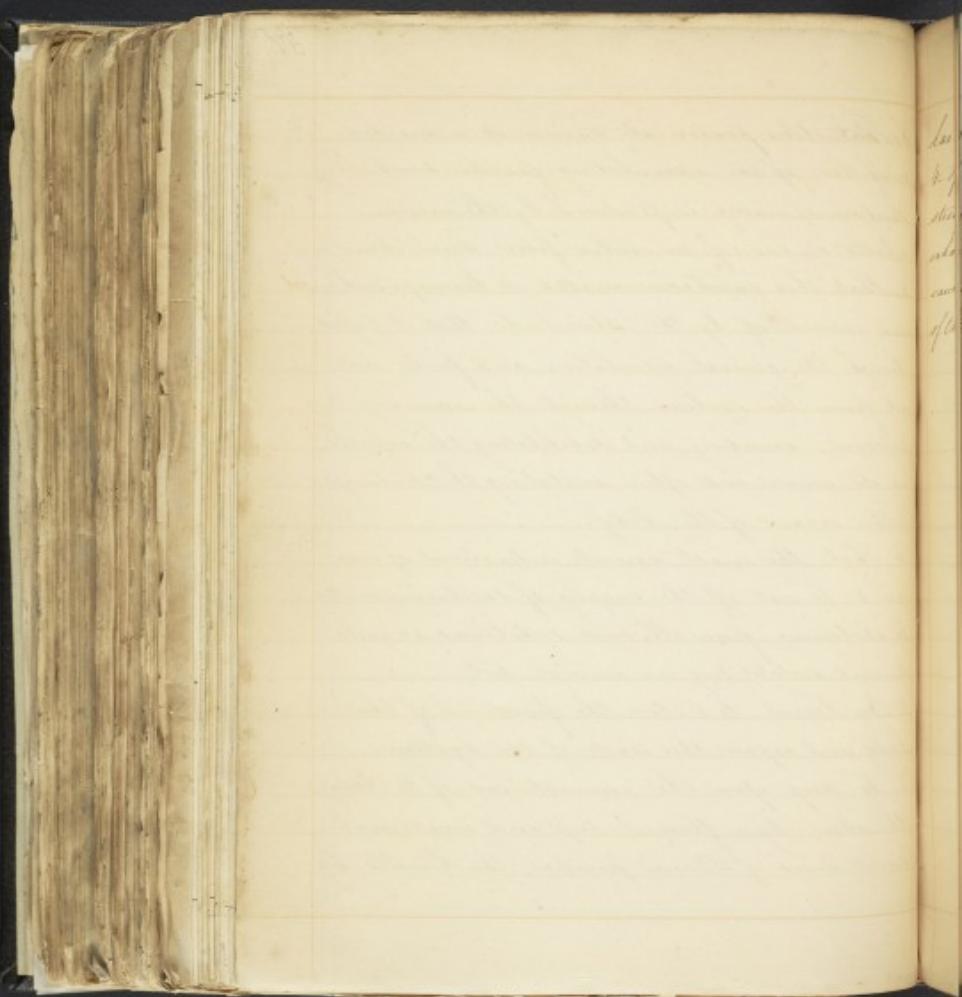
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the Intestinal Canal is over-loaded & great prostration exists, Cathartics will impair vigour instead of increasing the debility of the patient, & may it not be argued by analogy that in Diabetes, O.S. by relieving the vessels impacted with the component parts of the septic matter, enables them to recover their tone, at the same time that it removes in part, the foreign materials that irritate the kidneys, thereby diminishing inflammatory action which abstinence from vegetable substances cuts off the supply of the morbid materials. An animal diet & Tonics repair the waste of the system, but without further speculation, we deduce from the consideration of the foregoing facts & statements, the following conclusions:-

1. That Diabetes Mellitus is a disease of the whole system.
2. That the remote causes are any circumstances that produce debility of the assimilating function.



3. That the proximate cause is a morbid condition of the assimilating functions, whereby saccharine matter is produced by the extreme expells in lieu of muscular fibre, sinew, bone &c.
4. That this saccharine matter is decomposed and carried off by the Absorbents, that it passes through the general circulation and finds an exit from the system through the urinary passages, crowding and debilitating the expells in its course and often irritating the kidneys & other organs of the body.
5. That the most correct indications of cure are 1. To cut off the supply of saccharine matter by abstaining from all such substances as yield it, and substituting an animal diet.
2. By Tonics, to restore the functions of the body and repair the waste of the system.
3. To keep open the excretaries of the body, the skin, by a flannel dress and occasional small doses of Dore's powder, the bowels, by



laxatives, as castor oil &c. - and

4. If the pulse indicate congestion, and the strength of the patient be not too much exhausted, to relieve the oppressions by bleeding cautiously regulated according to the circumstances of the case.

